SOUTHERN POWER AND INDUSTRY

Ad Index, page 128

JUNE, 1953

In This Issue

REPORTS FROM SOUTHERN PLANTS

No. 5 Fuel Oil in Diesels . . page 58

Topping for Concrete Floors . . page 60

Air Handling Equipment . . page 62

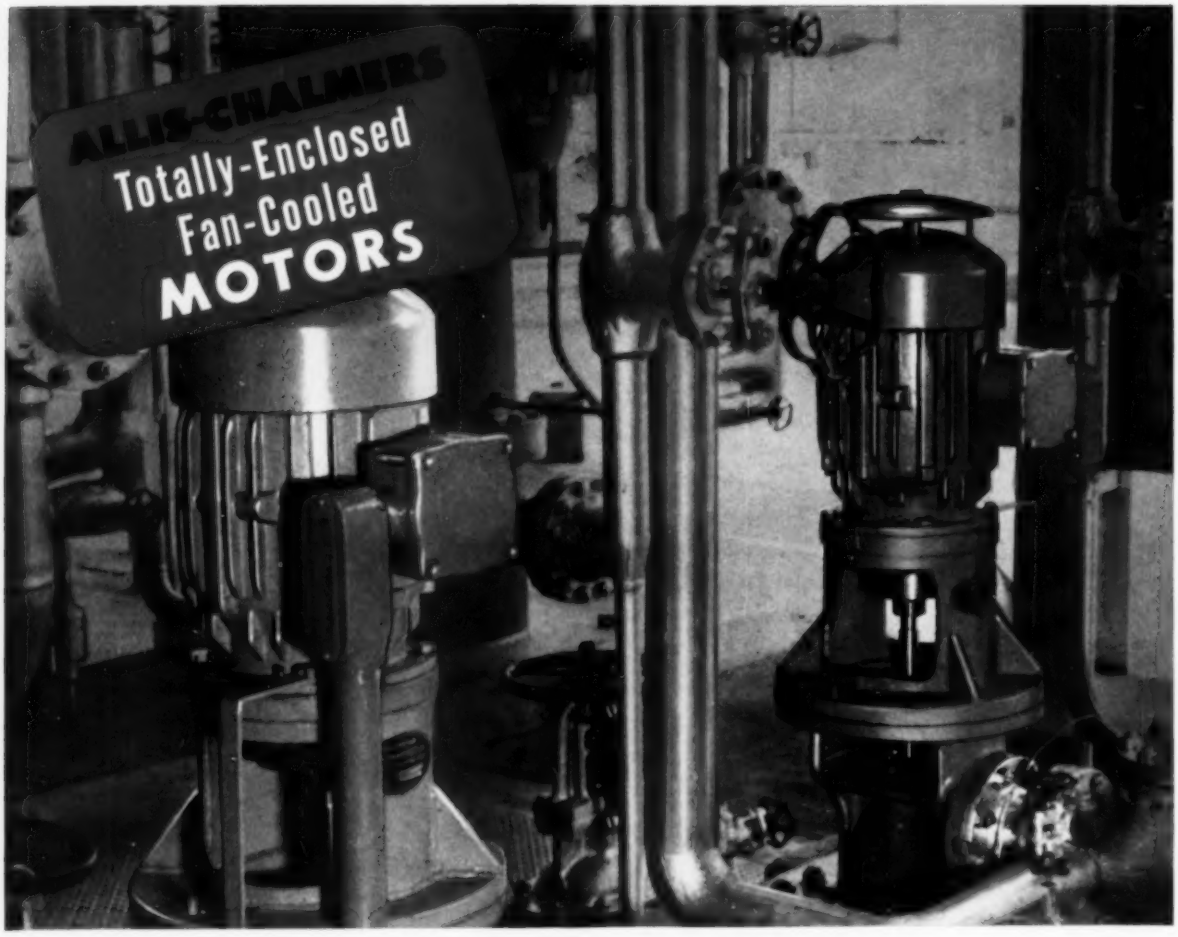
Oh . . That Catalog Psychosis . . page 72

Single Phase Motors . . page 78

For Full Table of Contents, See Page 3

Plastic Pipe

See Page 54



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1 Wide Open Air Flow

No enclosed external air passages to clog. Easy to clean with cloth, brush, air hose or vacuum. Simply remove fan cover and whole radiating surface is exposed for inspection and cleaning.

2 Cast Iron Construction

Frame, conduit box and fan cover of cast iron resist corrosion. Fan is non-sparking, corrosion-resistant material. Well suited to outdoor operation.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

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Ball bearings are double-shielded type, pre-lubricated at the factory. Periodic lubrication is not required under normal operating conditions, but provision is made for in-service lubrication if necessary.

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CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

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Executive and Editorial Offices: 806 Peachtree St., N.E., Atlanta 5, Ga. Entered as second-class matter at the Post Office, Philadelphia, Pa.
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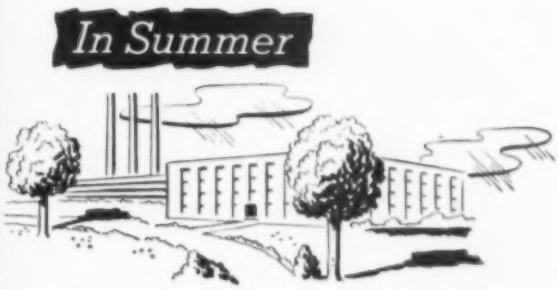
Volume 71 Number 6

CLARAGE *Multitherm*
AIR CONDITIONING UNITS

THEY HEAT AND HUMIDIFY



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. . . . *year-'round comfort at low cost*

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Multitherm Units come in vertical and horizontal types as shown—ten sizes—capacities 600 to 20,500 c.f.m. You use a direct expansion refrigerant, cold water or brine for cooling; steam or hot water for heating.

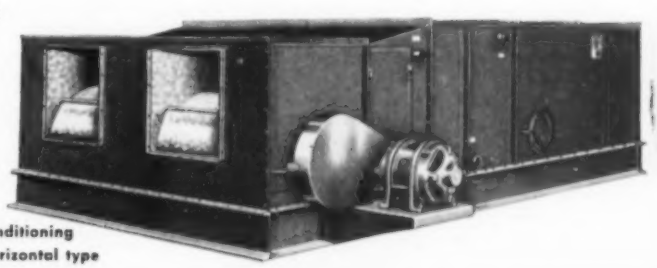
Multitherm Conditioning Unit—vertical type

. . . . *or process conditioning*

Aside from comfort applications in offices, plants, stores, etc., Multitherm Units are widely used in industry where production depends upon a certain temperature and humidity. Clarage Capillary Conditioners are available for cases where extremely close control is needed to meet requirements.

We welcome your inquiry for any desired information.

CLARAGE FAN COMPANY
Kalamazoo, Mich.



Capillary Conditioning Unit—horizontal type

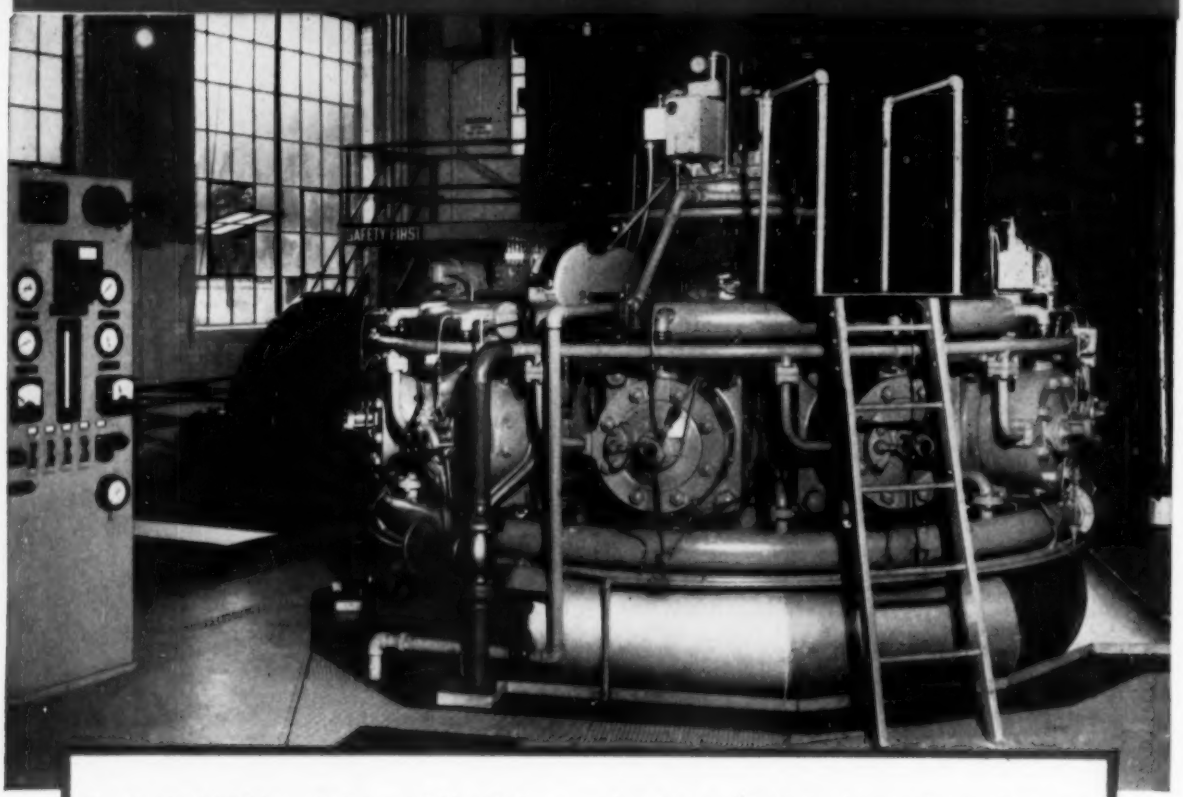
You can Rely on . . .

CLARAGE

Headquarters for Air Handling and Conditioning Equipment

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

"...SO MUCH BETTER LUBRICATION WITH TEXACO URSA OIL"



The Marshall (Michigan) Water and Electric Company started using *Texaco Ursa Oil* in two 5-cylinder Diesel engines in 1947. Results were so satisfactory — but read the story in the user's own words.

> "We got so much better lubrication with *Texaco Ursa Oil* — lower maintenance costs and fuel economy — that when we installed a new 6-cylinder Diesel in 1948 we naturally chose *Texaco Ursa Oil* to lubricate it. Same with the 11-cylinder radial Diesel we installed in 1951. As new Diesels go into our plant, you can be sure *Texaco Ursa Oil* is going in with them."

The Marshall Water and Electric Company's experience with *Texaco Ursa Oil* is typical. *Texaco Ursa Oil* is made for lubrication of Diesel, gas and dual-fuel engines. It stands up under toughest operating conditions . . . keeps rings free for proper compression and combustion, lower fuel consumption and lower maintenance costs. That is why —

> *For over 15 years, more stationary Diesel h.p. in the U.S. has been lubricated with Texaco than with any other brand.*

There is a complete line of Texaco Ursa Oils, approved by leading engine builders. A Texaco Lubrication Engineer will gladly help you select the proper one for your operation. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO URSA OILS

FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

SOUTHERN POWER AND INDUSTRY

JUNE 1953

Vol. 71 No. 6

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George Dockray
Regional Editor

M. M. Lyon
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J. A. Moody
Production Manager

Business Representatives

E. L. Rogers, 299 Madison Ave., New York 17, N. Y.—Phone Murray Hill 2-4959.

George Isherwood, 413 Alexander Ave., Drexel Hill, Pa.—Phone, Clearbrook 9-4536.

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W. Cliff Rutland, 1762 Poston Circle, Gastonia, N. C. — Phone 7995.

Annual Subscription—$1.00
Foreign—$10.00

Published monthly by
W. R. C. SMITH PUB. CO.
Atlanta, Ga., and Philadelphia, Pa.

Publishers also of *Textile Industries, Electrical South, Southern Hardware, Southern Automotive Journal, Southern Building Supplies.*

W. J. Rooke, President; R. P. Smith, Executive Vice-President; T. W. McAllister, Vice-President; E. W. O'Brien, Vice-President; A. E. C. Smith, Vice-President; O. A. Sharpless, Treasurer; A. F. Roberts, Secretary.

Feature Articles in This Issue

Plastic Pipe Data, by Raymond Seymour and Earl A. Erich 54
Applicational information for the man-in-the-plant

No. 5 Fuel Oil in Diesels Cuts Costs, by R. M. Weatherly 58
Comparative fuel costs in Tarboro, N. C., plant

Absorption Process Technique for Concrete Floors 60
Floor topping provides smooth, hard and tough surface

More Cubic Feet per Dollar, by Howard C. Burgin 62
Getting more economy from air handling equipment

What Industrial Engineers Do for Industry 66
Comments on the cost, quality and quantity of output

Pre-Cast Concrete Panel Construction in Memphis Warehouse 68
Pre-cast concrete and steel panels weighed 19 tons each

High Pressure Oxygen Equipment at Grace Chemical—Memphis 69
World's largest high-pressure, liquid-oxygen equipment

Automatic Heat Treating Unit at Line Material—Birmingham 70
3 timers, 52 limit switches, and 25 motors

Oh . . . That Catalog Psychosis, by Don V. Purington 72
An engineer confused by free-wheeling imagination

Let's Stop Asking Washington for It, by George Smathers 74
Problems of business and government—No. 7 of a series

Electrical Equipment Fundamentals, by A. T. Lohkamp 78
Questions and answers on single phase motors

Helping the Man-in-the-Plant

Transformer Overload Data	65	Display Board for Electricians	83
Radio Crane Dispatching	67	Correct Use of Pantograph	84
Repairing Machine Shafts	82	Insulating Parallel Pipes	84
Crane Cab Cooler	82	Fork Truck Fume Killer	86
Switch Eliminates Mishaps	83	Granite Drilling Technique	86

Departments—Facts & Trends 4; New Equipment 8; Buyers Information 16; Timely Comments 51; Industry Speaks 53; News 87; Future Events 88; Catalogs and Bulletins 122; Index to Advertisers 128.

Contents indexed regularly by Engineering Index, Inc.

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Editorial and Executive Offices: **SOUTHERN POWER & INDUSTRY, 806 PEACHTREE ST., N. E. ATLANTA 5, GEORGIA**

Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

June, 1953

► DOW POWER IN TEXAS is now 500,000 kw. Three interconnected power plants serve the chemical operations of the Dow Chemical Company at Freeport, Texas. The latest unit, 60,000 kw, at Plant No. 2 went on the line in April, 1953. The third, 40,000 kw, at Plant No. 3 is scheduled to go on the line this month. Total capability of Dow's three power plants at Freeport will be 512,000 kw — one of the largest industrial power plants in the country and the largest in the South and Southwest.

There is a vast difference between methods of power production in an industrial plant of this kind and a utility plant. Most notable difference is load factor. Another is the use of extraction and back pressure steam for process operations, which permits production of power and steam at very interesting costs. In continuous process plants the load (steam, power or compressed air) can never be dropped except in case of emergency. For this reason Dow has an unusual amount of stand-by equipment to insure continuity of operation.

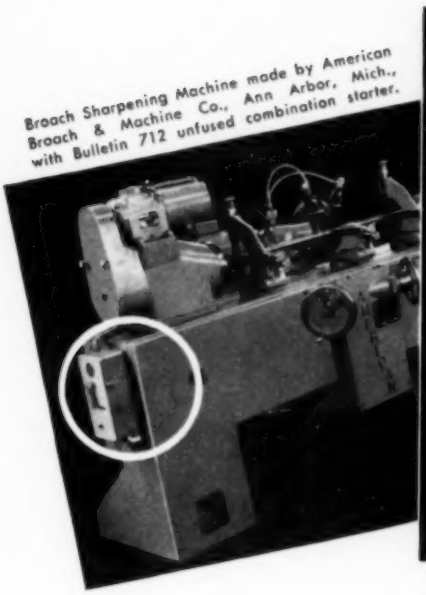
A. D. Rust, engineering consultant, The Dow Chemical Company, Freeport, Texas, will discuss the complete power system in the Aug. issue of SP&I. Semi-technical data will feature a brief history of Dow in Texas, development of the power system, and a complete description of the newest plant.

► CONTINUOUS POURING TECHNIQUES were used by Rust Engineering Company in the construction of columns, bleaching towers, and structure for Hollingsworth and Whitney's pulp and paper mill at Mobile, Alabama.

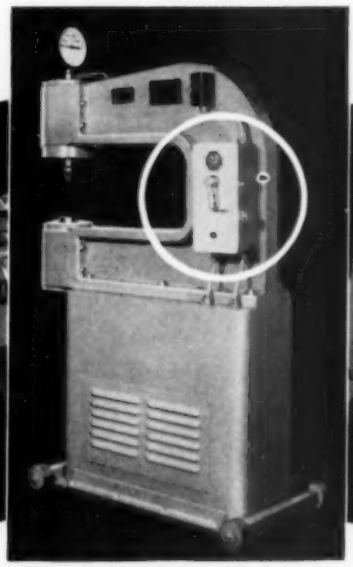
In the sliding form method of concrete construction, one-inch rods are set vertically among the reinforcing rods in the concrete at intervals. A screwjack mounted on a yoke climbs each special jack rod by means of dogs. As the screwjack is turned it pulls up the yoke which hauls up an attached wooden form and working platform. Rate of climb depends on rate the concrete sets — slower on a cool wet day, and fast on a hot dry day. The 20 ft jack rods are continuously extended by a pipe sleeve arrangement as the walls go up. Height of rods is carefully staggered for strength and continuous operation.

► THE TAPER-LOCK PRINCIPLE, already proved in millions of V-belt, coupling, conveyor pully and silent chain installations, is being applied to sprockets. Dodge Manufacturing and Morse Chain announce "stock availability" of Taper-Lock sprockets in this issue of SP&I. This means that costly and time-consuming reboring of sprockets to fit shafts is eliminated. Nor is it necessary that shafts be turned and ground to get a tight fit. Taper-Lock not only is keyed to the shaft, but grips it with the firmness of a shrunk-on fit. Yet, when a sprocket is to be replaced it comes off easily, quickly, and the bushing may be re-used.

(Continued on page 6)



Broach Sharpening Machine made by American Broach & Machine Co., Ann Arbor, Mich., with Bulletin 712 unfused combination starter.

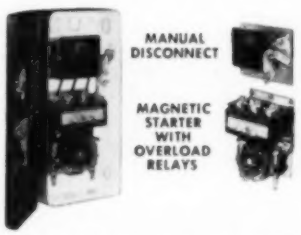


Brinell Hardness Tester made by Steel City Testing Machine, Inc., Detroit, Mich., with Bulletin 712 unfused starter.

Model 23-A Automatic Chucking Machine made by New Britain Machine Co., New Britain, Conn., with Bulletin 712 fused combination starter.

SIMPLIFY YOUR CONTROL INSTALLATIONS

by using A-B Combination Starters



BULLETIN 712 COMBINATION STARTER

An important feature of the Allen-Bradley combination starters is the mechanical interlock between operating lever and disconnect unit. The cabinet cannot be opened until the disconnect lever has been moved to open the disconnect switch. The magnetic switch is "dead" when the door is open . . . a valuable safety feature.

A great many machine tools need merely an automatic across-the-line starter and a disconnect switch. For such machines the ideal control unit is an Allen-Bradley combination starter . . . with starter and disconnect in one cabinet. Installation cost is less, too.

Look at the above well-known machines. See how neat and compact is the control unit . . . just one Bulletin 712 Combination Starter.

These A-B combination starters provide reliable overload protection for the motor. An overloaded motor is disconnected automatically and cannot be started until the overload is cleared.

Bulletin 712 Combination Starters have a manual disconnect switch, fused or unfused. Bulletin 713 starters have an instantaneous circuit breaker. A complete line of safety enclosures protects starter and safety switch or circuit breaker from water, dust, and explosive fumes. Let us send you Bulletin 712-713.

Allen-Bradley Co., 1328 S. Second St., Milwaukee 4, Wis.

ALLEN-BRADLEY SOLENOID MOTOR CONTROL

CONSULT YOUR LOCAL ALLEN-BRADLEY REPRESENTATIVE

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CHARLOTTE—Le Roy P. Spoon, 307 Lincoln St., Tel: 4-6334, 6-4301
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HOUSTON—Wilson Electrical Equip. Co., 2930 Commerce Ave., Tel: Atwood 1557
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SAN ANTONIO—Wilson Elect. Equip. Co., P. O. Box 5121, 101 E. Maple St., Circle 4-1471
SAN DIEGO—James A. Satchell, 301 W. "G" St., Tel: Franklin 3981
TULSA—John W. Elder, 1526 East Fourth St., Tel: 3-9149

facts and trends (continued from page 4)

► $30 MILLION INDUSTRIAL CENTER at Calvert City, Kentucky — the South's newest chemical center — constitutes a chemical complex of independent organizations coordinating their production. Chlorine and hydrogen from Pennsalt's new $8 million plant will be combined to make anhydrous hydrogen chloride. This and acetylene from Air Reduction's $10 million calcium carbide and acetylene generating plant is sent by pipe-line to the $5 million B. F. Goodrich Chemical Co. plant, where they are combined to make vinyl chloride monomer.

Pittsburg Metallurgical Co. and Pennsalt's hydrofluoric and sulfuric acid facilities are also located in the area. The new plants will add some 400 new industrial jobs to more than 400 created since Pennsalt's first plant went into operation in 1949, and will bring the annual industrial payroll of the Calvert City, Kentucky, area to an estimated $3 million.

► INSULATION TECHNIQUES at the 2,600,000 cu ft Freezer Company's cold storage warehouse in Leesburg, Florida, featured a "dry" applicational method, which eliminated the use of hot asphalt and attendant on-the-job hazards. Over 1,200,000 board feet of Fiberglas insulation were used.

Two layers of the insulation are in the walls. The Stik-Clip method, utilizing knife-like clips, was used for installing the second layer. Fiberglas insulation was impaled on the clips and then covered with perforated tempered hard board, 1/8 in. thick.

► STABILIZED NO-SWING CRANE, exhibited at the Materials Handling Exposition in Philadelphia, has a simple arrangement of hoisting ropes which form a triangular suspension, permitting a load to be held rigidly in place so as to eliminate longitudinal, lateral and rotational sway. Elimination of the load swing (Cleveland Tramrail method) is of help in speeding tank-dipping operations such as anodizing, chromodizing and similar plating operations.

► THE NEW 1953 SOUTHERN INDUSTRIAL DIRECTORY lists 12,500 Southern manufacturers employing 50 or more — one of the most comprehensive surveys yet made of the mushrooming industries of the South and Southwest.

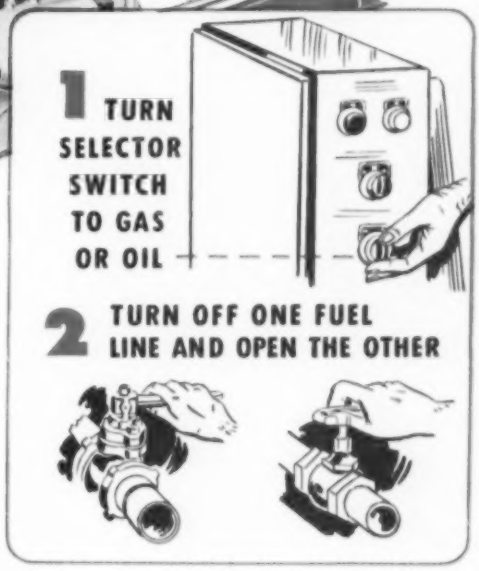
Last year's directory showed that the South was adding an average of one new multi-million dollar manufacturing plant per day. The new survey indicates that this rate of progress is continuing and that the variety of Southern manufacturing is increasing proportionately. Listings give firm name, address, and approximate number of employees. A state breakdown is provided under major headings. Published by the Southern Association of Science and Industry, the 1953 Directory is $5 per copy. Direct your request to SOUTHERN INDUSTRIAL DIRECTORY, 5009 Peachtree Rd., Atlanta, Ga.

► RADIO-CONTROLLED ELECTRIC TRUCKS are being profitably applied in large warehouse operations. Operator can move a stock trailer train by means of a control unit attached to his belt — forward, backward, or around corners — without going to the tractor. Operator can also ride the tractor and operate it in the conventional manner, without using radio control. It's a Barrett-Cravens development.

Write the editors for additional information on any of the above items. SOUTHERN POWER & INDUSTRY. 806 Peachtree St., N.E. Atlanta 5, Ga.

NOW... interchange Gas and Oil firing in *10 seconds*

Modern Cleaver-Brooks Model LR Steam Boiler Equipped with Exclusive Cleaver-Brooks "10-second conversion" Combination GAS and/or OIL Burner



TWO, simple motions eliminate time-consuming change-over

Now you can use oil or gas at the flick of a switch! This exclusive new Cleaver-Brooks development permits changeover from oil to gas or vice versa in only 10 seconds.

That's because the Cleaver-Brooks Combination Gas and/or Oil Fired Boiler operates on gas *with the oil burner in place.* Simply flipping a selector switch on the control panel to either gas *or* oil sets the proper circuit in action. Turning the convenient fuel supply valves completes the entire changeover — and in 10 seconds or less!

To gas users in all parts of the country — and in particular areas where local requirements demand immediate changeover — this exceptional fuel flexibility can be an important factor in determining your overall operating economy.

Ten-second conversion, like 4-pass construction, self-contained design, guaranteed 80% efficiency, is another "plus" feature pioneered by Cleaver-Brooks. It demonstrates Cleaver-Brooks' continuing effort to bring steam users even greater flexibility and reduced operating costs.

If you are considering simplifying your present boiler plant, remember Cleaver-Brooks Combination GAS and/or OIL Fired Boilers. Sizes 15 to 500 h.p. — 15 to 250 p.s.i. Write for complete facts.

Cleaver-Brooks

Originators of the Self-Contained Steam Boiler

CLEAVER-BROOKS COMPANY

Dept. G, 385 E. Keefe Ave., Milwaukee 12, Wis., U.S.A.
Cable Address: Clebro-Milwaukee

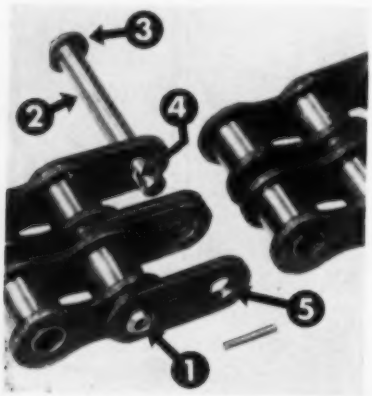
Builders of Equipment for the Generation and Utilization of Heat • Steam Boilers • Oil and Bitumen Tank-Car Heaters • Distillation Equipment • Oil and Gas-Fired Conversion Burners

Equipment . . Supplies . . Methods

for the plant engineer and operating force

Easy-to-Assemble Riveted Roller Chain

F-1 CHAIN BELT COMPANY, Baldwin - Duckworth Division, Springfield 2, Mass., has introduced an improved, easy-to-assemble riveted roller chain combining the long-wearing characteristics of riveted roller chain and the ease of assembly and disassembly of cottered chain.



The Improved Baldwin Assembly Riveted Roller Chain features a single pin coupler link. One end is firmly riveted to the adjacent link (1). The other end contains the Baldwin-Rex coupler pin (2). One end of this pin is spun over a washer (3) the other end has a milled flat and locking pin hole (4). This pin is an easy fit throughout the chain except for the milled flat end which is press-fitted into the special matching hole (5) of the single pin coupler plate. Thus, it is necessary to drive the pin only the length of its milled flat in assembling or disassembling the chain.

Basically, the chain is supplied in ASA standard and heavy series, 1 in. through 2½ in. pitch sizes in multiple widths. It is made up in 10 ft lengths of riveted chain, having an exclusive Baldwin-Rex Single Pin Coupler installed at the most convenient intervals. The spacing of the couplers varies, depending on the chain size, but they are placed in the assembled chain so any length can be made up without cutting rivets or damaging parts.

Free additional information is available to readers of SP&I. Circle the item code number on one of the reader service post cards provided on pages 17-18.

Vinyl Coating Method

F-2 PRUFCOAT LABORATORIES, INC., 50 East 42nd St., New York 17, N. Y., has developed a new vinyl coating system which combines the desirable properties of heavy-duty, drying-oil primer with the chemical resistance advantages of vinyl coatings.

In addition to possessing drying-oil properties, the new Primer P-50 is specifically formulated for use with active-solvent synthetics, and particularly with vinyl coatings. Painters handle the primer in exactly the same way they would the most conventional industrial primers. Normally, surface preparation means only simple wire-brushing and scraping to remove loose rust, scale, etc.

Unretouched photograph of Prufcoat CP Vinyl System panel. As illustrated, routine wire-brushing usually is the only surface preparation required prior to the application of one coat (aproximately 2 mils) of Prufcoat's new drying-oil Primer P-50. Two brush coats (or one spray) of Prufcoat "A" Series vinyl coating (in desired finish color) then complete the system, providing essential minimum thickness for average corrosive environments.

Steel ladder in this chemical plant shows no sign of corrosion 14 months after application of Prufcoat CP Vinyl System. Plant manufactures sodium hypochlorite which is destructive to all steel surfaces. Various coating systems previously tried in an effort to control corrosion invariably would fail in a matter of weeks — mere vibrations in the plant being sufficient to release large scales and sheets of rust.

Yielding in one coat approximately 2 mils dry film thickness on flat areas, the primer is not handicapped with the characteristic high surface tension of many synthetic coatings and has far less tendency to draw thin over prominences. Developer claims that its relatively low surface tension, heavy body and high total solids enable the Vinyl System to pro-

(*Continued on page* 10)

Rigid Field Inspection Assures Better Tank Construction

HORTON*
Elevated Water Tank

The 50,000-gal. Horton tank shown above provides a gravity water supply for the Woodside Mills Company at Liberty, South Carolina. During the erection of this structure, a Chicago Bridge & Iron Company Field Welding Supervisor was assigned to the job to instruct and qualify the welding personnel, inspect welding equipment and to supervise the cutting and grading of test plugs. This welding supervisory service—at no extra cost to you—is one reason why Horton tanks meet and surpass the most rigid specifications.

Write our nearest office for information, estimates or quotations on an elevated water tank for your needs.

**Trade Mark Registered in U. S. Patent Office*

CHICAGO BRIDGE & IRON COMPANY

Atlanta 3.....2180 Healey Bldg.
Birmingham 1.....1531 North Fiftieth St.
Boston 10.....1044—201 Devonshire St.
Chicago 4.....2107 McCormick Bldg.
Cleveland 15.....2218 Midland Bldg.
Detroit 26.....1534 Lafayette Bldg.
Havana .....402 Abreu Bldg.
Houston 2 .....2132 C & I Life Bldg.
Los Angeles 17...1545 General Petroleum Bldg.
New York 6.....3312—165 Broadway Bldg.
Philadelphia 3....1646—1700 Walnut St. Bldg.
Pittsburgh 19.....Alcoa Bldg.
San Francisco 4.....1531—200 Bush St.
Seattle 1 .....1345 Henry Bldg.
Tulsa 3.....1628 Hunt Bldg.

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, *and* GREENVILLE, PA. *In Canada*—HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

tect all vulnerable points as well as plane areas in a simple, economical and practical 3-coat application.

Primer bonds securely to most metals and can be depended upon to perform satisfactorily over old, corroded, wire-brushed metal. This is important in the majority of operations as ideal surfaces are rarely encountered.

Prufcoat Laboratories have combined the advantages of their new primer with the features of vinyl top coats to rout many causes of maintenance coating failures—poor adhesion, inadequate "build" at edges, underfilm corrosion, and rust creepage.

Boiler Gage Readings Televised to Operator

F-3 YARNALL-WARING COMPANY, 116 Mermaid Ave., Philadelphia 18, Pa., announces that television of Yarway Flat Glass Boiler Water Gages is now available as a result of arrangement between the Radio Corporation of America and Yarnall-Waring.

This new application brings "live" gage readings down to the operating panel or any other convenient location in the boiler plant. The television image is transmitted from the small, light-weight camera to the viewing monitor by a single cable. This simplified two-unit chain is standard RCA equipment. The special camera base provided, also furnishes proper lighting of the Yarway gages.

Yarway Gages, besides the pressure-sealed "floating assembly" feature, also offer for increased visibility requirements, a new separated-design advantage with interconnecting expansion loops, Welbond Gage Valves, circulating tie-bar and Type "M" Illuminators.

Prewinder Tool for Heli-Coil Inserts

F-4 HELI-COIL CORPORATION, 1285 Shelter Rock Lane, Danbury, Conn., has announced the availability of a new inserting tool molded of duPont nylon, for installation of stainless steel wire thread inserts.

The lifetime guarantee which accompanies this new tool states that if the user ever breaks the nylon sleeve in service, he need only return the tool to the manufacturer and it will be replaced at no charge. Under comparable conditions, the new tool should complete from 3 to 5 times as many installations as its predecessor.

The prewinder tool is available in many popular sizes for use with Heli-Coil's entire line of stainless steel wire thread inserts. Prewinder thread in the tip of the tool compresses diameter of the wire thread insert and aligns its helix to match the helix of the tapped threads to be protected. A slotted mandrel with a crank handle engages the tang on the insert. Turning the handle screws the insert into the nylon prewinder thread. The tapered nose of the prewinder then is placed against the tapped hole. Further turning of the handle winds the insert into the tapped hole—the tool acting as a thread guide.

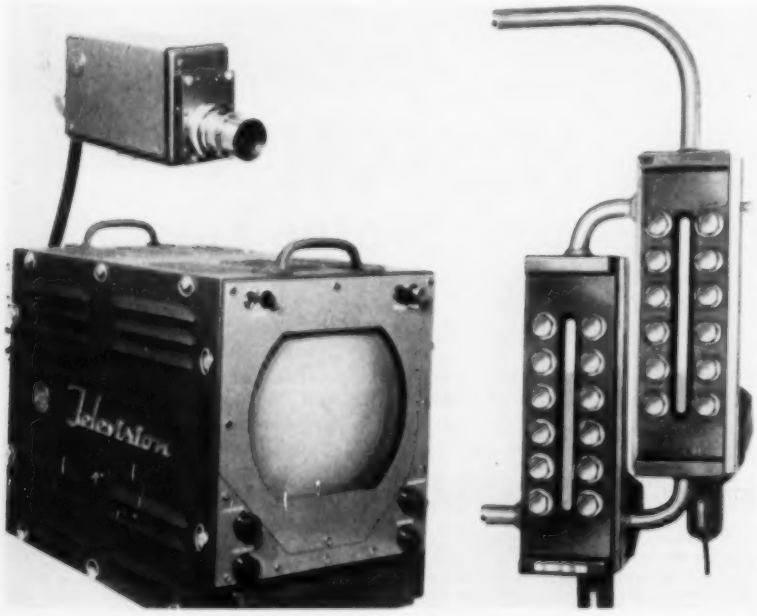
Compressing and guiding action of tool—when combined with a large nylon sleeve permitting a firm grasp—makes insert installation effortless. Helically wound wire thread inserts are extensively used in production salvage and maintenance operations to repair damaged threads.

Sample Cooler for Steam or Boiler Water Measurements

F-5 INDUSTRIAL INSTRUMENTS, INC., 89 Commerce Road, Cedar Grove, N. J., announces a new sample cooling coil, employing Cupro nickel tubing.

The device consists of a Cupro-nickel concentric coiled tubing, stainless steel connecting blocks, an industrial-type dial thermometer and bracket for wall mounting. The new unit allows checking of high pressure steam or boiler water by means of an electrolytic conductivity cell. The

(*Continued on page* 108)



Pacific BOILER FEED PUMPS

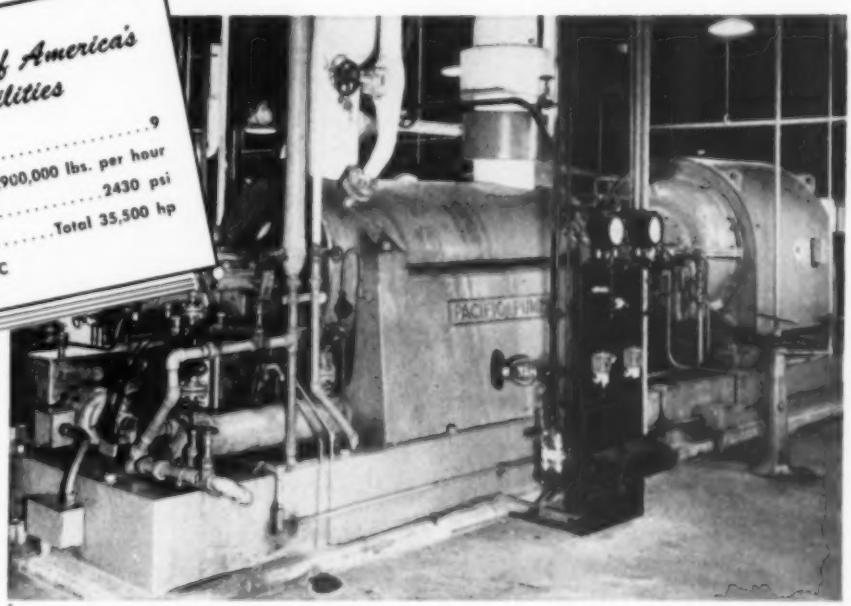
are Custom-Built to your specifications

Write your own "prescription":

Rx

NAME: *One of America's largest Utilities*

NUMBER OF PUMPS.....9
CAPACITY.....Total 7,900,000 lbs. per hour
DISCHARGE PRESSURES.....2430 psi
ELECTRIC MOTOR DRIVE.....Total 35,500 hp
CUSTOM-BUILT BY PACIFIC



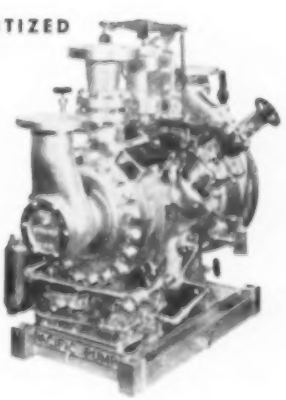
Pacific Boiler Feed Pumps are fabricated from selected materials to provide the utmost structural strength and stability – maximum resistance to corrosion-erosion and wear. Built in multi-stages for capacities to 2700 gpm; discharge pressures to 3000 psig; speeds to 5000 rpm.

Pacific SINGLE STAGE UNITIZED STEAM TURBO PUMPS

less unit cost–
less floor space–
steady dependable output!

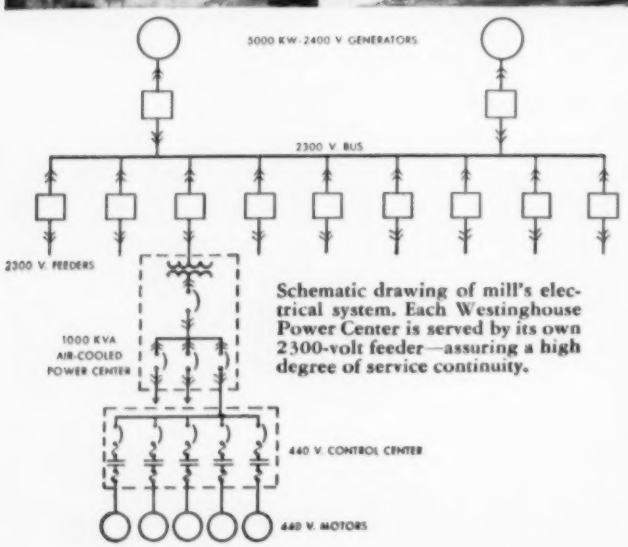
Capacities to 500 gpm
Discharge Pressures to 1100 psi
Steam to 900 psi – 850° F. TT
Exhaust Pressures to 50 psi
Speeds to 10,000 rpm

Write for bulletins 109 and 118

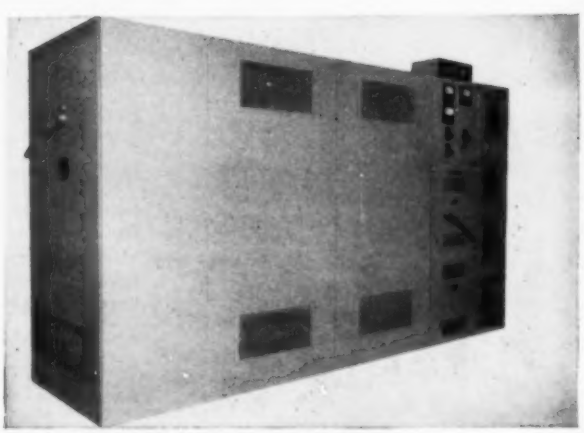


PACIFIC *Precision Built* **PUMPS**

Pacific Pumps inc.
ONE OF THE DRESSER INDUSTRIES
HUNTINGTON PARK, CALIFORNIA
Export Office: Chanin Bldg., 122 E. 42nd St., New York • Offices in All Principal Cities



Schematic drawing of mill's electrical system. Each Westinghouse Power Center is served by its own 2300-volt feeder—assuring a high degree of service continuity.



Westinghouse 1000-kva Air-Cooled Power Center, 2300/440 volts, is factory assembled as a complete unit. Rating can be increased 25 percent by adding forced ventilation.

Get reliable, low-cost power by bringing high voltage close to loads

Men responsible for plant engineering functions will be interested in how St. Regis Paper Company provided reliable, low-cost electrical service in their new Pensacola mill. Round-the-clock production schedules had to be maintained—365 days a year. Power failures would work extreme hardship.

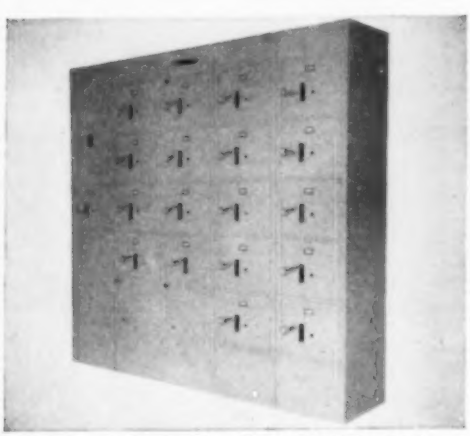
Called during the blueprint stage, Westinghouse helped the mill's engineers plan a modern radial distribution system. It is so designed that each power center is served by its own primary feeder. Thus, feeder and transformer faults are isolated quickly to the services of a single power center. A higher degree of service continuity is assured.

Westinghouse unitized equipment—pre-assembled and tested—helped keep power distribution costs to a minimum. Long runs of heavy, 440-volt feeders were eliminated. Feeder loss was cut. Wiring and conduit were greatly reduced.

Further, maintenance problems were simplified, since breakers and controls are easily accessible... and parts are standardized and interchangeable.

CONSIDER THIS: It takes *sound planning* and *co-ordinated equipment* to provide modern distribution systems, capable of meeting your plant power needs today and in the years ahead. Westinghouse offers you both... and backs them with years of experience, gained throughout all industry.

A call to your nearest Westinghouse office will bring an application engineer, well qualified to go over your distribution problems with you and your engineers. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-94956



Starters are grouped in self-standing Westinghouse 440-volt Control Centers—factory assembled and wired with terminal boards. This simplifies installation and maintenance.

YOU CAN BE SURE...IF IT'S

Westinghouse

"TOM: —
IN THE FIRST YEAR AFTER WE CHANGED OUR PLANT TO FUSETRON FUSES, WE ENTIRELY ELIMINATED MOTOR BURNOUTS FROM SINGLE PHASING AND REDUCED ALL MOTOR BURNOUT BY AT LEAST 75% "
(Excerpt from a conversation of Forrest Baumgardner with Tom Wier)

FORREST BAUMGARDNER, *Chief Electrician*,
Frank Wheatley Pump & Valve Mfr.
Tulsa, Oklahoma.

"FOREST:— DON'T FORGET FUSETRON FUSES DO MORE THAN PROTECT MOTORS — THEY PROVIDE 10 POINT PROTECTION!"

TOM WIER,
BUSS Fuseman,
covering Tulsa, Okla.

1 Protect against short-circuits.*

2 Protect against needless blows caused by harmless overloads.

3 Protect against needless blows caused by excessive heating — lesser resistance results in much cooler operation.

4 Provide thermal protection — for panels and switches against damage from heating due to poor contact.

5 Protect motors against burnout from overloading.

6 Protect motors against burnout due to single phasing.

7 Give DOUBLE burnout protection to large motors — without extra cost.

8 Make protection of small motors simple and inexpensive.

9 Protect against waste of space and money — permit use of proper size switches and panels.

10 Protect coils, transformers and solenoids against burnout.

* Fusetron Fuses have high interrupting capacity as shown by tests of the Electrical Testing Laboratories of New York.

Here's why FUSETRON Fuses give All Purpose protection...

A fuse link combined with a thermal cutout — the result, a fuse with tremendous time-lag and much less electrical resistance.

They have the same degree of Underwriters Laboratories approval for both motor-running and circuit protection as the most expensive devices made.

Made to same dimensions as ordinary fuses, FUSETRON FUSES fit all standard fuse holders.

Obtainable in all sizes from 1/10 to 600 ampere, both 250 and 600 volt types. Also in plug types for 125 volt circuits.

Their cost is surprisingly low.

FUSETRON is a trade mark of the Bussmann Mfg. Co.

Don't Risk Losses!

One **lost** motor . . .
One **needless** shutdown . . .
One **destroyed** switch or panel
One **burned out** solenoid . . .

May cost you far more than replacing every ordinary fuse with a Fusetron dual-element Fuse.

Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo. (Division of McGraw Electric Co.)

Please send me complete facts about FUSETRON dual-element Fuses.

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901 **CENTRIFUGAL BLOWERS AND EXHAUSTERS** — Bulletin A-650, 12 pages, describes the design features and the applications of Hoffman multi-stage centrifugal blowers. Capacity tables, work data and handy information included.—U. S. HOFFMAN MACHINERY CORP.

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959 **THERMAL INSULATION** — Chart IN—6D, 11¼" x 18", suitable for hanging on the wall, shows at a glance the recommended insulation for every temperature range from —400°F to plus 3000°F.—JOHNS-MANVILLE CORP.

960 **UNIT HEATERS**—Thermolier Catalog—Describes the important features of Thermolier unit heating, an economical method of adequate plant heating. —GRINNELL CO., INC.

992 **FIRE PROTECTION**—Bulletin 2319 describes Blaw-Knox Deluge systems, wet and dry pipe sprinkler systems, water spray and fog systems, rate-of-rise sprinkler systems, etc., and indicates how a sprinkler system pays for itself out of insurance savings.—BLAW -KNOX SPRINKLER DIV., BLAW-KNOX CONSTRUCTION CO.

Continued on page 122

6-53-2

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Man has never mastered the art of suspended animation . . . of just plain standing still. We all move, but it's up to us whether it's to the front or the rear.

Ideas are what makes the difference. Unless you look for ideas constantly, you are probably going backwards. That is why the editors exert every effort to make SOUTHERN POWER AND INDUSTRY a magazine that will stimulate original thought and new ideas for you. It brings to you each month a wide interchange of ideas and methods for improved efficiency in plant management and operation.

In one package, SOUTHERN POWER AND INDUSTRY comes to you as one of the most valuable and least expensive pieces of equipment available to plant management and operating men anywhere. And now, by clipping the card below and sending it to us, you can have SOUTHERN POWER AND INDUSTRY for three years as well as Mr. Wages' profitable book, "Electricity and Electrical Power" for only $3.00.

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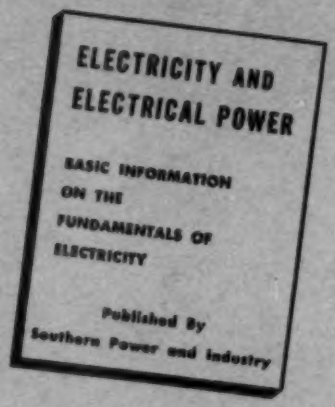
JUST RELEASED

"Electricity and Electrical Power"

BASIC INFORMATION ON THE FUNDAMENTALS OF ELECTRICITY


ELECTRICITY AND ELECTRICAL POWER
BASIC INFORMATION ON THE FUNDAMENTALS OF ELECTRICITY
Published By
Southern Power and Industry

for the first time available in ONE Volume!

A limited edition of this important handbook has just been printed and is available to subscribers to SOUTHERN POWER AND INDUSTRY only. Order your copy NOW with a new or renewal subscription to this magazine.

A series of seven articles, "Electricity and Electrical Power" by Roy W. Wages, industrial engineer for Georgia Power Company, was published last year in SOUTHERN POWER AND INDUSTRY and received wide attention and favorable comment from plant engineers in the South and Southwest.

Demands for reprints of this series became so great that we have had all the articles bound in one volume. This useful 72-page book is now available to SOUTHERN POWER AND INDUSTRY subscribers exclusively.

In simple, practical terms, Mr. Wages makes clear the mysteries of electricity all the way from explaining and defining a volt to a discussion of the sine curve of alternating current motors. The book is liberally illustrated with diagrams and pictures which help make the text crystal clear. Throughout the pages, the author does everything possible to simplify the presentation of facts for easy study and understanding.

Here is a book you will want to keep for reference and for training periods. Pocket sized, it is convenient to carry anywhere . . . for checking right on the job.

All you have to do to own this valuable booklet is to check the card below now, and send it back to us. For three dollars, you get a three-year subscription to SOUTHERN POWER AND INDUSTRY *plus* "Electricity and Electrical Power"!

The editors will welcome you into the growing family of SOUTHERN POWER AND INDUSTRY readers.

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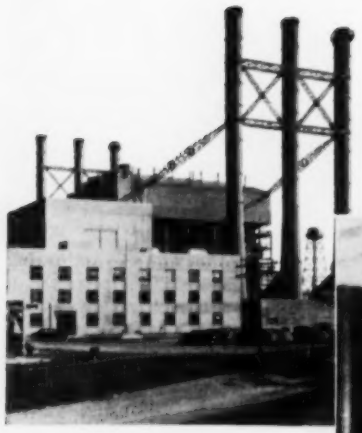
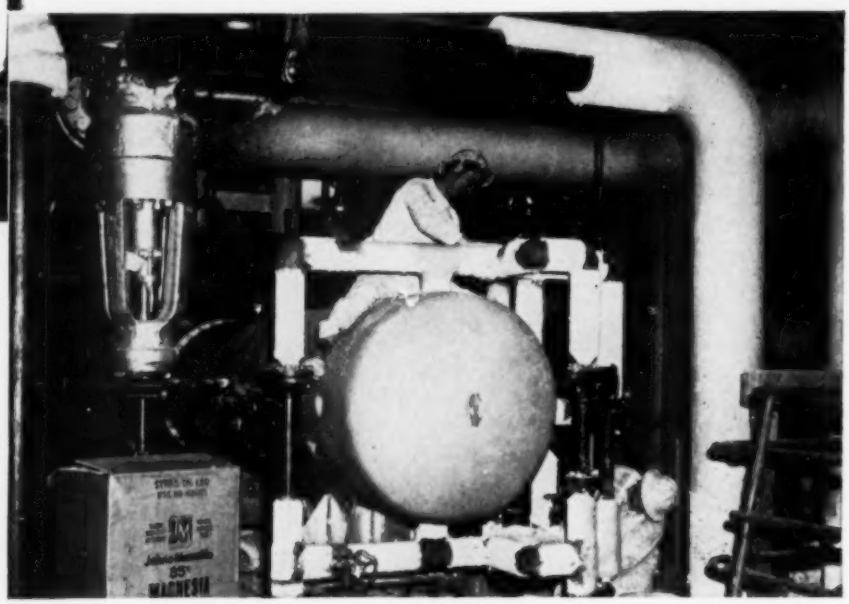
WE'RE GIVING HIM THE OLD OIL! That "onion" in the hand of our technician contains a laboratory ash sample of used Diesel engine lubricating oil which he is about to burn in a spectrographic arc. If this test shows an indication of metal in excess of normal in the oil residue, the culprit locomotive is headed for the shops *fast* for a complete inspection, just in case the beginnings of trouble may be brewing "under the hood." The Southern is one of the few railroads owning and using this new, special spectrographic testing equipment. For one of the best ways we've found to give consistently good service is, like this, to meet trouble half way and catch it *before* it happens. **SOUTHERN RAILWAY SYSTEM.**



At the new Moss Landing generating plant



(Top) Moss Landing, California steam plant of the Pacific Gas and Electric Company, designed by Stone and Webster Engineering Corporation, under the supervision of the P. G. and E. Engineering Dept.

(Right) Skilled applicators of an outstanding J-M Insulation Contractor, Western Asbestos Company of San Francisco, applying J-M 85% Magnesia to pipelines during construction of the Moss Landing plant.

P. G. and E. INSULATES WITH SUPEREX-85% MAGNESIA TO LOWER POWER PRODUCTION COSTS

When Pacific Gas and Electric Company invested $80,000,000 in its new 771,000-horsepower electric generating giant at Moss Landing, California...the insulation, like all other materials, had to meet rigid specifications. *For this important project, Johns-Manville Superex-85% Magnesia double-layer insulation was used on superheated steam pipes.*

Superex Combination Insulation consists of Superex*, a J-M insulation for temperatures to 1900F, and J-M 85% Magnesia. It was installed at the Moss Landing plant for maximum thermal efficiency and long trouble-free service. This double-layer construction, proved in over a quarter-century of outstanding on-the-job performance, utilizes the higher heat resistance of Superex next to the hot surface—the greater insulation value of J-M 85% Magnesia for the outer layer. It eliminates through joints, protects the jacket against scorching and is unharmed by expansion encountered in pipes carrying superheated steam.

J-M 85% Magnesia is the leading insulation for temperatures to 600F. It will not distort regardless of its length of service. It fits snug, stays tight. Heat savings, therefore, remain constant for the life of the equipment on which it is applied.

Whatever the insulation—it must be properly engineered and installed to pay maximum dividends. That's why Johns-Manville offers industry the services of experienced J-M Insulation Engineers and J-M Insulation Contractors. These men stand ready to combine their talents and give you an insulation job that will more than pay off your initial investment with maximum fuel savings.

For further information, write Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay Street, Toronto 1, Ontario.

Double-Layer Superex-85% Magnesia Insulation was used on superheated piping at the P. G. and E. Moss Landing plant.

*Reg. U. S. Pat. Off.

Johns-Manville *FIRST IN* INSULATION

MATERIALS • ENGINEERING • APPLICATION

NO SEAT TO SCORE, WEAR,
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● *Yarway Seatless Blow-Off Valve showing balanced sliding plunger in closed position. For pressures to 400 psi. Available singly or in tandem, angle or straightway.*

BEHIND IT . . . *AN ENGINEERING REASON*

More than 16,000 boiler plants use Yarway Blow-Off Valves. Why?

Because behind each valve is an engineering reason.

Take the Yarway Seatless Blow-Off Valve for low and medium pressure boilers. *It has no seat to score, wear, clog or leak.* The unique balanced sliding plunger eliminates a common source of blow-down valve trouble. Many boiler shut-downs are saved . . . power interruptions avoided and . . . production speeded.

Specify Yarway Blow-Off Valves on your boilers—*including package units*. You'll be rewarded by dependable, trouble-free blow-down service.

Write for Yarway Blow-Off Valve Bulletin B-425 (pressures to 400 psi) or Bulletin B-433 (pressures to 2500 psi).

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YARWAY | *blow-off valves*

NAVCO "Universal" PIPE SUPPORTS

Vertical adjustment up to 2½ inches can be made.

Support may be turned to any angle of 360°.

Will take care of 8 inches of travel.

Features

Universal Pipe Supports hold the pipe down as well as up. They prevent pipe from getting out of alignment, which is usual when Roller Supports are used.

They permit control of expansion movement and insure the desired free action of Slip Expansion Joints so essential in tunnel and duct work.

Expansion movement of pipe will not disturb the insulation.

Made in Cast Iron or Steel and provided with forced lubrication for lines exposed to the weather.

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"BURNING COAL THE MODERN WAY CUT OUR POWER COSTS $51,000 A YEAR!"

"Up-to-date coal installation cut fuel consumption 20.3% . . . labor force 47%!"

says Mr. George E. Bennett, Supt. Motive Power, Chicago & Eastern Illinois Railroad.

"We recently modernized the power plant at our Oaklawn Shops in Danville, Illinois. The savings we've realized in labor and fuel proved to us you can't beat *bituminous* coal burned with modern equipment."

Here's the new power plant of the C&EI Railroad's Oaklawn Shops at Danville, Illinois. By burning coal the modern way this plant saves a total of $51,180 a year—*will pay for itself in less than seven years.*

This is a view of the firing aisle showing the spreader stokers which are fed by a weigh larry. Three new boilers now do the work that formerly required seven. Man-days per week required to operate the plant have been reduced from 112 to 59!

● Low price—dependable supply—safe storage—coal gives you all these no matter how you burn it.

But you can get much more!

Get more steam for every dollar—burn coal in a *modern* combustion installation. Cut your labor costs—install automatic coal and ash handling equipment. If you call in a consulting engineer—he can show you how coal can do a better job for you with equipment designed to meet your *specific* needs.

Of all the fuels, coal alone has virtually inexhaustible reserves. And to supply this coal, America has the world's most productive and efficient coal industry. That's why you can count on coal for dependable supply, relatively more stable prices—now—and in the future, too!

If you operate a steam plant, you can't afford to ignore these facts!

COAL in most places is today's lowest cost fuel.

COAL resources in America are adequate for all needs—*for hundreds of years to come.*

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

BITUMINOUS COAL INSTITUTE

A Department of National Coal Association, Washington, D. C.

FOR HIGH EFFICIENCY FOR LOW COST

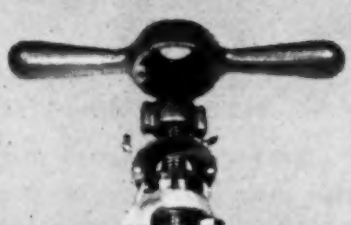
YOU CAN COUNT ON COAL!

TO AVOID THIS

(WASTING MANPOWER TO OPERATE HARD-TO-CLOSE HIGH PRESSURE VALVES, ESPECIALLY IN AN EMERGENCY)

SPECIFY EDWARD VALVES WITH IMPACTOR HANDWHEELS

One man using an Edward Impactor handwheel can equal the closing force of three strong men on an ordinary handwheel. Saves space, can be operated in cramped quarters, uses no toggle or gears, needs no cinch bars. Standard on many valves, optional on others. Edward catalogs detail its design. Write for literature.



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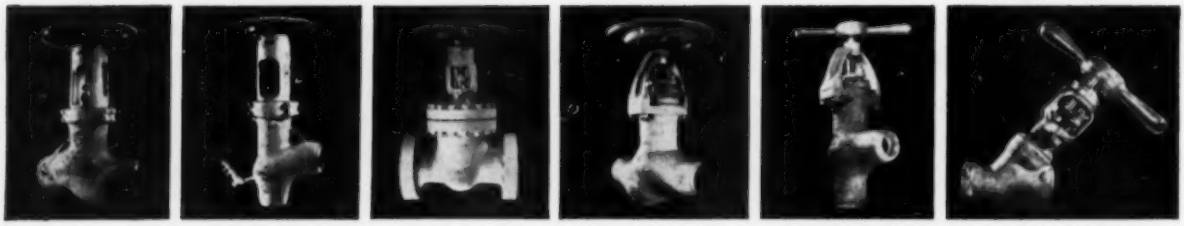


HALL INDUSTRIAL WATER REPORT

Hall Laboratories, Inc.—A Subsidiary of Hagan Corporation, Pittsburgh, Pa.

Volume 1 | JUNE 1953 | Number 3

Boiler Scale Formation And Control Subject Of Paper by Rivers

In a recent paper, "Concentrating Films: Their Role in Boiler Scale and Corrosion Problems," H. M. Rivers, Director of Engineering Service for Hall Laboratories, discusses the theory of how and why highly concentrated films form on steaming surfaces, the mechanism of steam generation and scale formation, characteristic effects of concentrating films, and problems associated with degree of film concentration.

Mr. Rivers points out that water consultants are responsible for treating boiler water so that concentrating salts do not crystallize out of solution, or precipitate in forms which will accumulate continuously as solid deposits. Further responsibility: natural constituents or added chemicals in boiler water must not give trouble because of decomposition or volatilization under "film" conditions; and corrosive concentrations of free caustic must be safely avoided.

On the other hand, boiler makers must design for heat input rates which limit tendency toward excessive concentrations, and provide adequate circulation and turbulence to assure rinsing of all steaming surfaces.

Write for your free copy of this informative paper.

Radar Plots Course Of Illinois' Water

The greatest water resource of the State of Illinois lies in the air moving across it, Dr. A. M. Buswell, chief of Illinois State Water Survey, reported at the recent American Power Conference.

Radar tracks the release of this water to land surface as rain from thunderstorms. Not only are storm paths logged, but the amount of rainfall can be estimated.

Accumulation of such data provides a basis for future efforts to trap more rain.

CONSULT WATER SPECIALISTS BEFORE BUILDING!

Future Water Problems are solved in planning stage

Calling in the specialists of Hall Laboratories before a plant is built can save many dollars and much time. Hall engineers study plant requirements and needs, and come up with important recommendations which can then be incorporated in the plant as it is built.

Consider a recent instance. Hall was called in by the consulting engineers of a large, New York State manufacturing company that had decided to construct a plant in California. The problem involved was the proper treatment of the local city water supply, for use in boilers at the new plant. Changes in the available water would occur frequently due to the mixture in the system of water from four different sources, all varying widely in composition. These changes could markedly alter the composition of the plant's water supply within less than an hour's time.

To properly prepare this water, a flexible pre-treating system was recommended by Alex Henricks and approved by his associates on the Hall headquarters staff. Designed to insure good quality water under any conditions, the equipment suggested was simple to operate and sized so that capacity would be adequate regardless of incoming water composition; yet frequent attention would not be required to keep the system in proper operation.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information write, wire or call Hall Laboratories, Inc., P.O. Box 1346, Pittsburgh 30, Pa.

Water is your industry's most important raw material. Don't waste it.

Water Important Topic Of ASME Meeting in L. A.

Major interest appears to focus on three papers dealing with corrosion produced by condensed steam, but other water problems are not neglected at the two sessions sponsored by the Joint Research Committee on Boiler Feedwater Studies and the Power Division at the mid-year meeting of the American Society of Mechanical Engineers at Los Angeles, June 29 to July 3.

Woolen Yarn Dyer Improves Cleaning, Dyeing Operations With Hall Technique

Unsatisfactory yarn scouring, plus the intermittent need for 35% more acid in dyeing operations than tests indicated should be needed, plagued this yarn dyeing concern, a new client of Hall Laboratories.

Noting that dye kettles were heated with direct-contact steam from a low-pressure boiler, the Hall engineer checked steam for carryover of alkaline boiler water. At peak load, samples were heavily contaminated; even at normal load, carryover was appreciable.

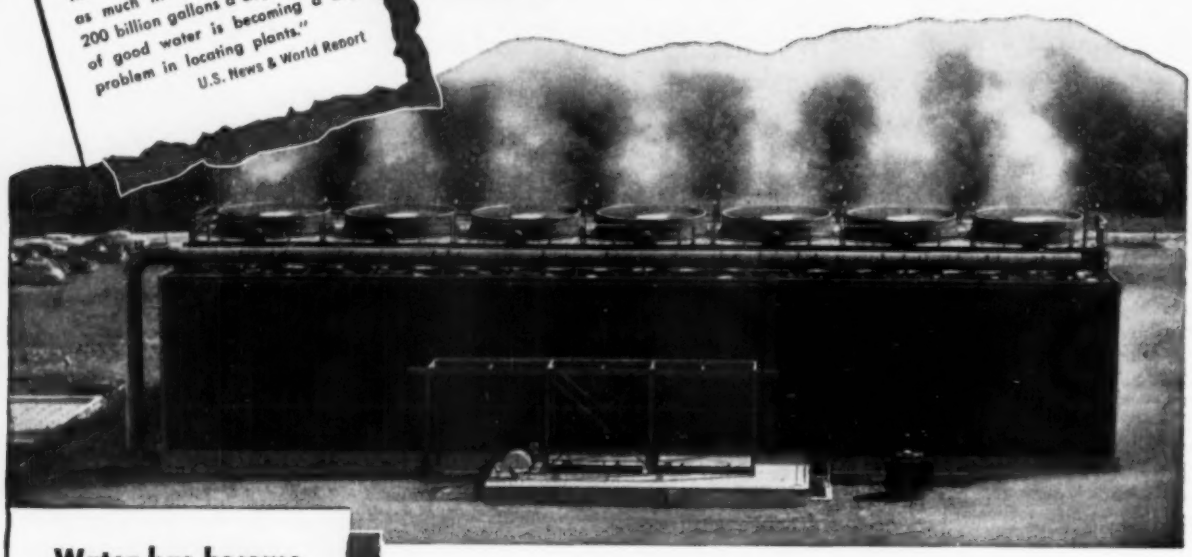
The Hall engineer recommended using Hagan Anti-Foam to reduce steam contamination. Now, even for heaviest loads, steam contains less than 3 ppm dissolved solids, higher boiler water solids are carried with resulting savings in water, heat, chemicals.

this Marley Cooling Tower will be *twice* as valuable tomorrow!

2½ times as much water in 1975...

". . . And there's industrial water — water used by industries for cooling or washing, or as a material. Industry will be needing 2½ times as much in 1975 — something like 200 billion gallons a day. Shortage of good water is becoming a key problem in locating plants."

U.S. News & World Report



Water has become a problem...

"Even water, once regarded as a 'free commodity' of virtually unlimited supply, has become a problem. . . . The essence of the . . . problem is costs."

Fortune

Industry will spend about $10 billion more...

"The waste of our civilization threatens one of our vital resources: water. . . . It is estimated that . . . U.S. industries will probably have to spend about $10 billion more . . . " (to handle waste water in the next 20 years).

Scientific American

In 1975, according to reliable estimates, American industry will require 2½ times as much water as it does today. It follows that the ability of your present cooling equipment to conserve water will be of much greater value tomorrow when water is twice as scarce. Provided, of course, that the cooling towers you buy now are still operating in 1975.

If you buy Marley towers today, you are investing in this added value, for only Marley offers the rugged, service-proved structural features that assure such long-term, trouble-free performance. Marley provides today the design refinements that will still be modern in years to come—full height louver walls . . . open distribution . . . MortisLocked filling . . . mechanical equipment engineered exclusively for cooling tower service.

Many Marley towers have been in service for 25 years —and continue to deliver cold water day in, day out. That's why, no matter what your term of amortization, you will find a Marley cooling tower among your major assets long after it has been written off the books.

For a sound investment in the future of your company, buy your next tower from Marley, world's leading producer of water-cooling equipment.

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To you, the cash value of *our* experience could mean thousands of dollars. We've had the opportunity to analyze thousands of tubing installations because we are the world's largest manufacturer of tubular steel products. Over the years, we've kept records of our findings. We are happy to offer you the advantages of this unique and valuable "experience file" at no cost to you.

You may be having trouble with high pressures, corrosion, heat, or exposure. Well, before you make a definite decision on your tubing requirements, give us a chance to help you. No matter how new and unusual your problem appears to be, we may already have the answer to it in our case history "experience file."

The next time you are ready to order tubing, whether in carbon, alloys or stainless steel, consider National Seamless Pipe and Tubing. This applies whether you are rehabilitating present equipment or expanding your facilities. Do *yourself* a favor. Bring your problems to "tubing headquarters." Write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S NATIONAL *Seamless* PIPE AND TUBES

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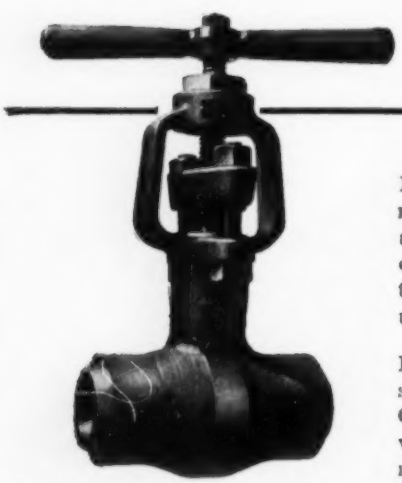
UNITED STATES STEEL

GET ALL 24 ADVANTAGES

Choose Hancock

1500# and 2500# STEEL WELDVALVES

1. NO BONNET JOINT TO LEAK.
2. NO GASKET TO LEAK.
3. NO SEAT INSERT TO LEAK—stellite seat is integral.
4. Corrosion-resistant disc minimizes the possibility of cavitation.
5. Disc pad reduces wear on stem and disc connections.
6. Corrosion and galling-resistant disc nut.
7. Simple locking of disc and disc nut.
8. Self-compensating yoke protects seat and disc against wire drawing, leaks and damage.
9. Centerless ground stem—300 Brinell for high resistance to galling, stem pitting, erosion and wear.
10. Non-galling and corrosion-resisting stem guide—essential in a high-temperature valve.
11. Packing inhibited against stem pitting.
12. Non-slotted packing seat.
13. Uniform packing gland load.
14. Alloy steel packing studs—stronger, better.
15. More than adequate stuffing box depth.
16. Corrosion-resisting back seat.
17. No left-hand threads.
18. Simple thread bushing locking.
19. Proved 1500# and 2500# ratings at 1050°F.
20. Design proved in high-temperature valve research and applications since 1935.
21. Meet A.S.M.E. blow-off requirements without special installation.
22. No excess weight to create piping strains.
23. Compactness that saves space.
24. Valve stays in the line for servicing.



High-pressure, high-temperature steam plants must have the safest, most dependable shut-off valves obtainable. That is why Hancock 1500# and 2500# Weldvalves are preferred by the majority of design and operating engineers in such plants. They know from long experience that these rugged valves end the costly hazards of valve leakage—stand up in the severest service.

Hancock 1500# and 2500# Steel Weldvalves are made in ¼" through 2" sizes inclusive. Service rating is up to 2500# W.S.P.—1050°F., and 6000# O. W. G.—100°F. Whatever your needs, remember only Hancock Weldvalves have *all* the design, quality and construction features essential to reliable leak-proof performance. So—protect your personnel, plant and service to customers—install safe Hancock Weldvalves.

When Hancocks go in, valve costs go down

1077 HANCOCK U.S.A.

HANCOCK VALVES

A product of **MANNING, MAXWELL & MOORE, INC.** Watertown 72, Massachusetts

MAKERS OF 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL INSTRUMENTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

COCHRANE WATER CONDITIONING
STARTS WHERE NATURE STOPS

AT PENNSYLVANIA ELECTRIC CO.

IT'S A COCHRANE DEMINERALIZER

Cochrane Demineralizer Installation at Pennsylvania Electric Co., Erie, Pa.— Gilbert Associates, Inc., Engineers, Reading, Pa.

• To supply high quality water for boilers operating at 1250 P.S.I.G. the Pennsylvania Electric Company installed a Cochrane Automatic Demineralizer in their Erie, Pa. Power Station. Designed for silica removal, this unit handles 400 GPM in preparing make-up for the boilers.

Demineralization is one of many "water problems" Cochrane's engineers solve every day. Water softening, dealkalization, and deaeration are others—all complex—all requiring expert and specialized knowledge. Whether for process or boiler feed water Cochrane can supply the answer to your particular problem, backed by 90 years' experience in solving industrial water conditioning problems. You'll be sure of unbiased recommendations because Cochrane designs and builds all types of water conditioning equipment.

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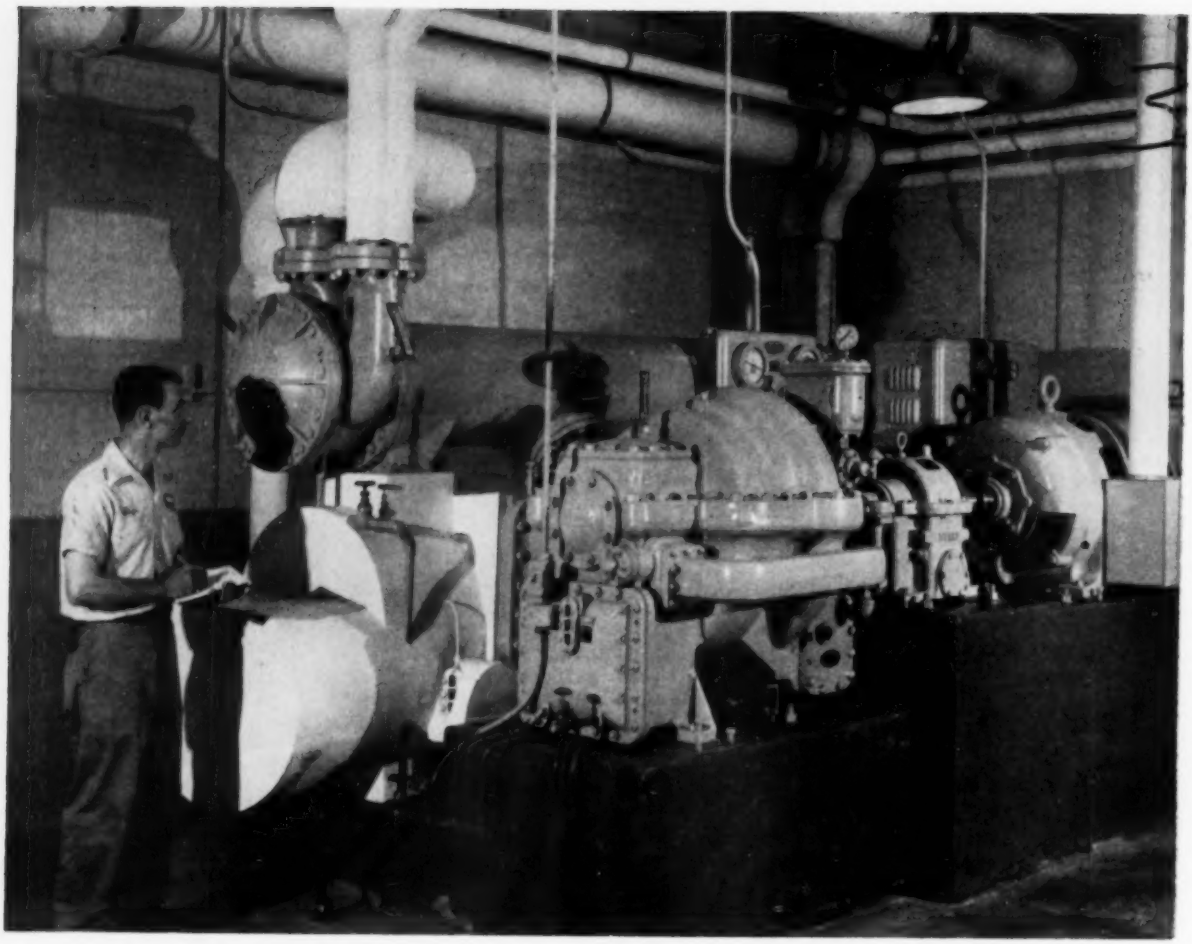


You Can't Tell

YOU CAN'T DETERMINE efficiency by sound alone. Just because the wheels of your machinery are humming does not necessarily mean that down time caused by faulty lubrication is being held to a minimum. The problem of lubrication becomes more important and more difficult with the ever increasing complexity of modern industrial equipment operating at higher speeds with closer and closer tolerances, higher loads, and under varying operating conditions. To be sure of having the proper lubricants to fill your specific needs, call an experienced Standard Oil lubricating engineer. His knowledge, gained through constant contact with the power industry, is backed by the world's largest combined facilities for the research, testing and engineering of petroleum products. It will be well worth your while to call him today.

Standard Oil Company
(KENTUCKY)

STANDARD OIL
LUBRICANTS

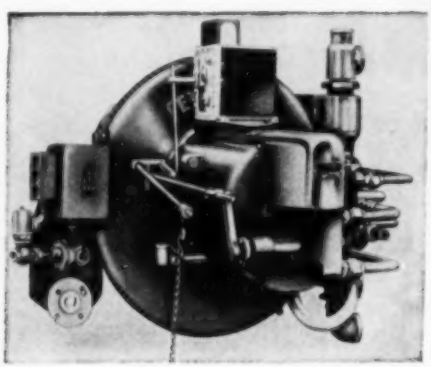
NO MATTER WHAT THE DEMAND

THERE'S A

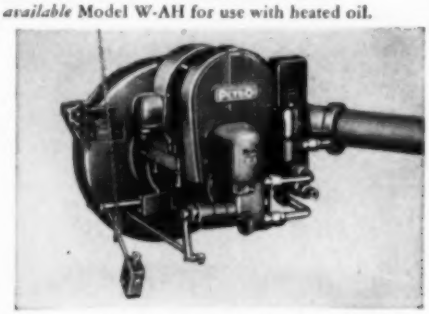
Petro

INDUSTRIAL OIL BURNER

to handle it!



Shown above Model WA for use with cold oil.
Also available Model W-AH for use with heated oil.



Model G-W Combination oil-gas.

Cut Fuel Costs with Heavy Fuel Oil

Petro rotary oil burners are built for firing all types of boilers up to 600 boiler horsepower, and also for many other industrial applications. They are designed to burn the low-cost, heavy fuel oils with complete reliability, Petro oil burners slash fuel costs two ways—they burn the *lower priced oils*, and they do it with *outstanding efficiency*. Fluctuating steam demands are answered automatically with Petro modulating flame control. Thousands of owners will tell you that Petro Industrial Oil Burners are fuel savers, labor savers and trouble savers, and their dependability is traditional.

Your heating contractor can tell you about Petro burners. Turn to "Oil Burners" in telephone book yellow pages. See catalog in Sweet's Architectural File, or mail coupon below.

INDUSTRIAL—COMMERCIAL—RESIDENTIAL
An oil burner for every need

PETRO

50 Years of Leadership in
Automatic Heating and Power Equipment

PETRO, 3218 W. 106th St., Cleveland, Ohio.
In Canada: 2231 Bloor St., West, Toronto, Ontario.

○ Please send me the Petro catalog of commercial-industrial oil and gas-oil firing equipment.

Name_____

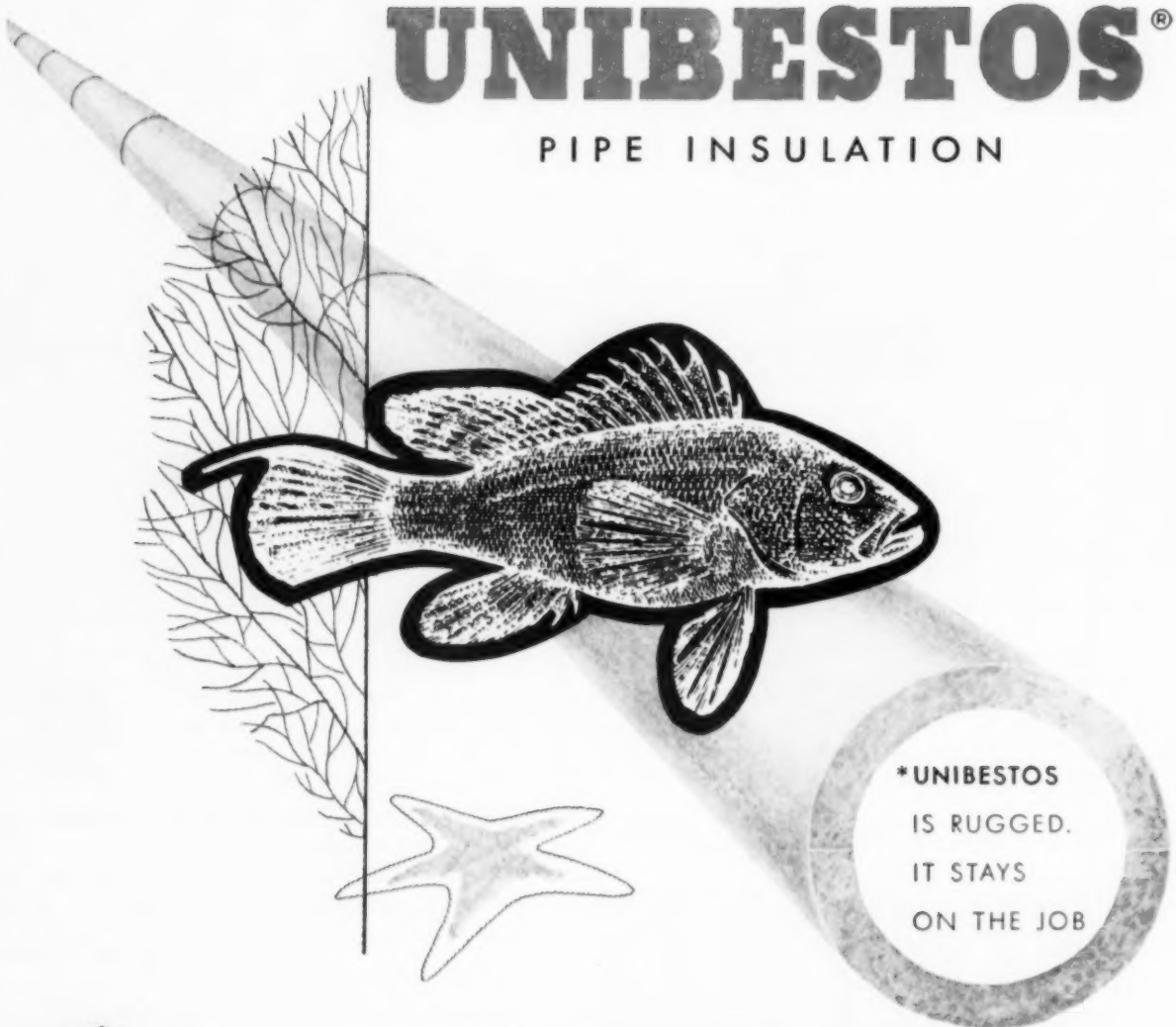
Address_____

City_____ State_____

Unaffected even after weeks under water*

UNIBESTOS®

PIPE INSULATION

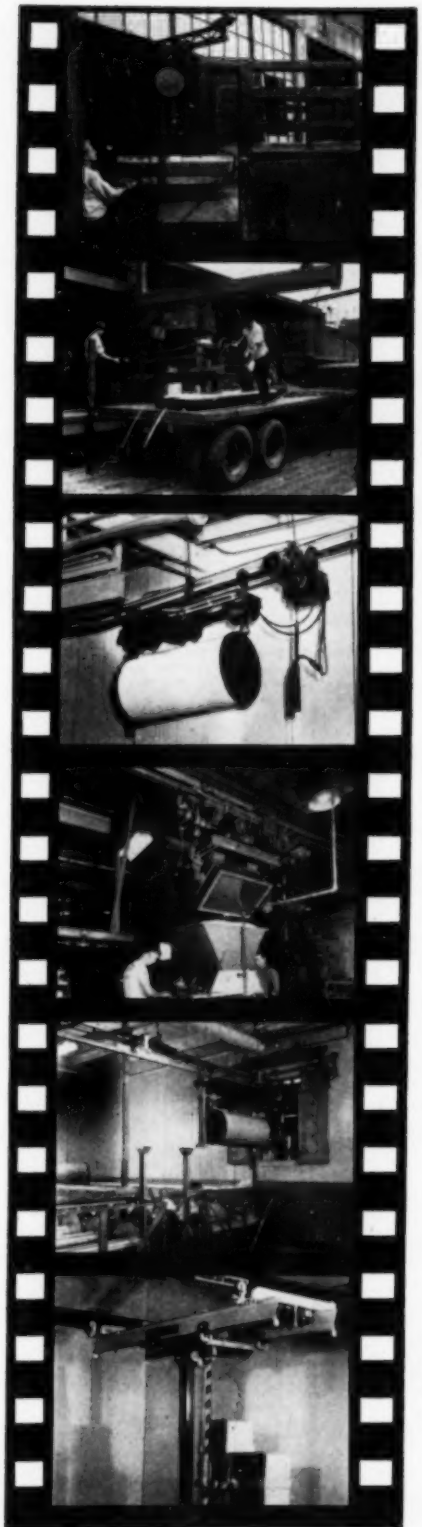


*UNIBESTOS IS RUGGED. IT STAYS ON THE JOB

UNARCO

UNION ASBESTOS & RUBBER COMPANY

DEPT. F-6, 332 SOUTH MICHIGAN AVENUE, CHICAGO 4, ILLINOIS



Quickly removes die blocks from trucks

Saves $30 each truck unloaded

Delivers beams to another building

Automatic delivery of core sand

Automatic transfer of slasher beams

Stacker crane increases storage by 60%

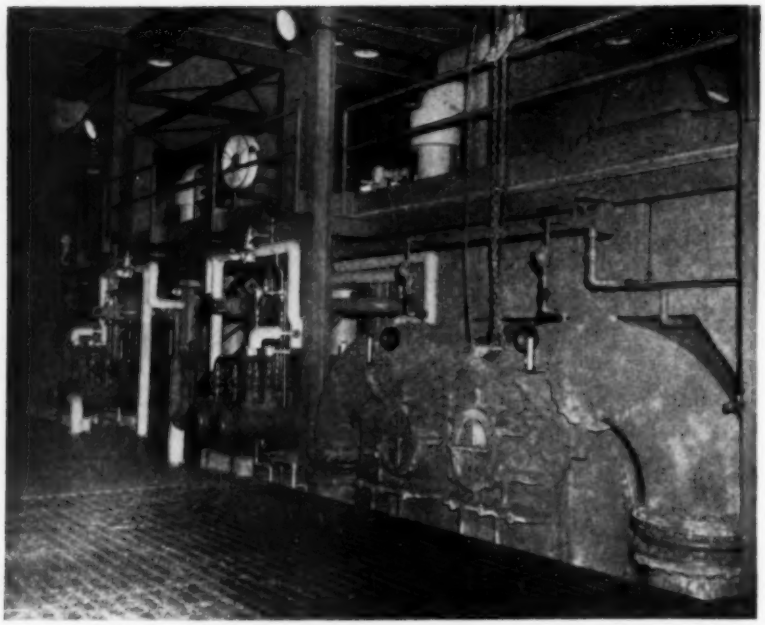
a 16 mm movie that discusses handling problems common to every industry

Before you decide upon any material handling equipment, let us loan you "Up and Over". This 16 mm film shows many installations of American MonoRail overhead handling equipment. You will see hand operated to fully automatic systems—one or more that may be particularly adaptable to your operations. The film is educational, interesting, informative and shows the way to economical, safe and time-saving material handling. Your ticket of admission is only a note to us asking for a print. It will help us if you advise the exact date, as close as possible, when you wish to use it.

THE AMERICAN MONORAIL COMPANY

13105 ATHENS AVENUE **CLEVELAND 7, OHIO**

Undeniable Proof of



2—10,000 sq. ft. Divided Flow CONSECO Condensers installed in the Humboldt, Iowa, plant of the Corn Belt Power Co-Op. Shown alongside these units are the Twin-Element 2-Stage CONSECO Air Ejectors and Single-Stage Non-Condensing Hogging Ejectors.

CONSECO

PERFORMANCE

1947 2–10,000 sq. ft. units installed and in operation

1949 1–14,000 sq. ft. unit presently being installed

1951 1-14,000 sq. ft. unit being constructed

All in the Same Plant

CONSECO engineers are available at all times to meet your specific requirements in heat exchanger equipment. Their long experience and the complete fabricating facilities of Condenser Service are assurance of your obtaining maximum performance and economy. Send for illustrated engineering bulletins on CONSECO equipment.

CONSECO offers:

CLOSED HEATERS

DEAERATORS

BOILERS

EVAPORATORS

REFINER FILTERS

CONSECO

Condenser Service & Engineering Co.

HOBOKEN, N. J.

ANACONDA FORUM
for the Electrical Industry

REVISED ELECTRIC POWER EXPANSION PROGRAM

By: Walker L. Cisler, Chairman,
Electric Power Survey Committee,
Edison Electric Institute

FOLLOWING the outbreak of fighting in Korea in June 1950, the electric power systems of the United States promptly anticipated greatly increased power demands and revised the planned electric power expansion program sharply upwards. Between June of 1950 and April 1951, new generating projects totaling 20 million kilowatts were undertaken and orders for the equipment were placed with the manufacturers. As shown in the table, by April 1951 new projects totaling 32.1 million kilowatts were scheduled for operation, mostly before the end of 1954.

NEW POWER GOALS FOR 1956

Now, nearly two years later, the electric power expansion program has been enlarged further to total 47.7 million kilowatts planned for commercial operation in the years 1951 through 1956 and the programs for 1955 and 1956 are still incomplete. Thus within less than two years it has been necessary to plan and begin construction of projects having a generating capacity of 15.6 million kilowatts to keep pace with the electric power demands now forecast for 1954, 1955 and 1956. Approximately 4 million kilowatts of this is specifically for new requirements of the Atomic Energy Commission.

SHORTAGES HAMPER FULFILMENT

The progress which was made in 1951 and 1952 in fulfilling this program has been disappointing. In April 1951 about 16.0 million kilowatts of capacity was scheduled for operation in the two years, 1951 and 1952. Largely because of delays in obtaining materials for equipment manufacture and field construction, only 13.5 million kilowatts were completed in those two years.

The 2.5 million kilowatts which were not completed in 1952 have now been rescheduled into 1953, some projects, originally scheduled for 1953, have been rescheduled into 1954 and other projects, originally scheduled for 1954, have been rescheduled into 1955.

NEW PROGRAM CALLS FOR GREATER EFFORT

As a result of these changes, and the additions to the total program, 12.2 million kilowatts of new capacity are now scheduled for completion in 1953 and 10.6 million kilowatts in 1954. This is a truly stupendous program and because of the material shortages which have occurred during 1951 and 1952, there are grave doubts whether these goals can be met.

Great effort will be needed by all concerned to carry the program forward as closely as possible to schedule. Power requirements for 1953 and 1954 can be estimated with reasonable accuracy and capacity now planned is essential to provide satisfactory margins.

As we progress through the years, new requirements will develop, additional projects will be planned and efforts to complete them must continue unabated.

ELECTRIC POWER EXPANSION PROGRAM

Capacities Given as Millions of Kilowatts—Manufacturers Nameplate Rating

Scheduled for Operation	As of April 1, 1951	As of April 1, 1952	As of January 1953
1951	7.5	6.9*	6.9*
1952	8.5	8.9	6.6**
1953	10.7	11.9	12.2
1954	4.8	10.3	10.6
1955	0.6	4.0	9.2
1956	—	—	2.2
Total	**32.1**	**42.0**	**47.7**
New Capacity Planned Since April 1, 1951		9.9	15.6

*Actually completed during 1951.
**Actually completed during 1952.

SERVICE NEEDED FOR 3,750,000 UNITS BY 1956

New ANACONDA Type N-SD Service Drop Cable can help speed installation . . . available in copper or aluminum

That's the mark the nation's builders will shoot for in the next 3 years (according to F. W. Dodge Co.). Power companies must match their efforts by providing prompt and adequate electric service.

Important consideration will be given to speed, ease and appearance of installation. These requirements are met by ANACONDA Type N-SD Cable—available with either neoprene or polyethylene insulation.

This cable handles easily . . . looks neat . . . is durable . . . resists weather. Two insulated conductors are wrapped around—and fully supported by—a bare neutral messenger. Conductors remain free of tension!

RIGHT TO THE RANGE. Where Type N-SD Cable is used to the weatherhead, contractors will find SILVALINE*, ANACONDA's URC Type SE Service Entrance Cable economical to install through meter and fuse box right to such appliances as ranges, water heaters. SILVALINE has special silvery finish that won't "blotch" when painted.

*Trademark

ANACONDA FORUM

BUILDING OR EXPANDING YOUR ELECTRICAL PLANT?

In either planning a new electrical plant or correcting and improving an inadequate plant, it may save many a future headache to consider carefully these cable-selection pointers:

- An ample-size conductor always works for you.
- Choose your cable covering for its environment.
- Improve voltage regulation by using a larger conductor, reducing conductor spacing, dividing (or paralleling) circuits, improving power factor, and keeping high fluctuating load on separate feeders.
- Avoid loading feeders above 400 amperes, except in unusual cases. Above 400, cable becomes bulky, conduit expensive, difficult to install, and amount of load dropped on a fault is considerable.
- Conductor size should meet requirements for voltage regulation and current-carrying capacity for normal load and for motor circuits, short-circuit amperes.
- For greater reliability in insulated conductors, select Type RH, RH-RW, TW or Butyl-insulated instead of Types R or T.
- Aluminum conductors are satisfactory when properly installed.

"Bottlenecks" have no more place in power distribution than in shipping, accounting or administration departments. Best cure for electrical inadequacy is to install a well-designed, thoroughly engineered electrical system at the start . . . with cable that is right for the job.

BIG BOOM IN THE VALLEY. U.S. Steel builds its new Fairless Works in rural Bucks County, Penna. To meet the expanding needs for power—in new plants and homes—utilities in the area are adding new generating capacity and rushing new transmission and installation lines in the Delaware Valley.

ANACONDA FORUM

INDUSTRIAL LIGHTING . . .

It's important to match cables to today's lighting needs

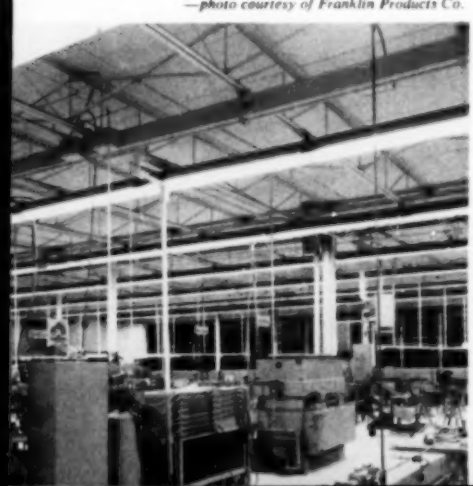
There are many reasons why today's lighting requirements are greater than in the past. There is a very definite relationship between higher intensity of illumination and greater and more efficient (or lower-overall cost) production. The demand for better lighting is continually increasing because people's ideas change with the continuous increase in efficiency of light production. You can readily see that today's industrial lighting, more often than not, requires fair-sized cable for feeders and branch circuits. Transformers located at convenient points make long runs less frequent and less necessary.

The principal conductors which may be used in industrial lighting are Types R, RH and RH-RW rubber and TW thermoplastic. Cables must be selected to satisfy two requirements: safe ampere load and permissible voltage drop. The smallest size—No. 14 Awg—should be used with care. Allowable current ratings, as given in the National Electric Code, are for safety only and may not satisfy voltage-drop requirements at all. This latter point cannot be stressed too often.

Good lighting is an important production tool. But, regardless of the number of units installed, a lighting system is no better than the circuits that serve it. Good lamp life and illumination efficiency depend upon operation at rated voltage—and this is only obtainable with circuit adequacy. And last but certainly not least, the design of the circuit should be made flexible enough to permit additions or alterations in the future. Some recent jobs have been designed and installed so that feeders and branch circuits are good for twice the present illumination.

THIS WORK AREA, 80 x 140 ft., is lighted by 136 fixtures to provide 50 foot-candles. Each fixture has two 75-watt, 96T-12 standard warm white fluorescent lamps.

—photo courtesy of Franklin Products Co.



All-Purpose DURASHEATH Cable is selected by industrial plants to simplify installations

The order of the day is expansion of power facilities. In industry this expansion means new power lines. Where these lines demand different types of cable as they shift from one location to another, time-consuming jointing becomes necessary. Jointing costs money . . . slows down cable installation.

Industrial plants have found a way out of these difficulties. They select DURASHEATH*, Anaconda's neoprene-jacketed power cable. This time-tested cable may be buried, strung overhead, and run in ducts *in one continuous run.* One cable type—not three—is needed.

DURASHEATH is available in all sizes, single or multi-conductor, copper or aluminum, from 600 to 15,000 volts. Use it for power cable in industrial plants, railroads, series or multiple street lighting, traffic control, and airport† lighting, residential primaries and secondaries, and for Type USE cable for underground service entrance.

*Reg. U.S. Pat. Off.

†when ordered to CAA Specifications L-824

SHORTS THAT MAKE SENSE

TAILOR-MADE. Do you know that you can purchase "packaged" power load centers and their components? You will find them easily installed and easily moved. They are well-engineered and basically right for your electrical plant. When you select the right cable to match them, you produce safe operation, prolong cable life and add to your service dependability.

WRONG CABLE. Here's a story with a moral: it pays to choose the right cable. An industrial plant routed a 1-conductor, 500 Mcm rubber and braid (Type R) conductor for a feeder run through 3 buildings, one a boiler house. Result: early failure where it ran through the boiler house. Insulation and braid became brittle, cracked and of no value. Ambient temperature was too high.

SAVE AND IMPROVE. Dry-type transformers have made great strides in their development for lighting. If you locate them at any convenient nearby point, you will save on copper size and at the same time improve voltage regulation.

START RIGHT. Cures cost money; prevention always has a lower price tag. To avoid trouble from electrical inadequacy, install a well-designed, thoroughly engineered system in the beginning. If you inherit an inadequate system, make specific check-ups at once to find the causes; then take proper steps to remedy the situation. Don't wait for real trouble. It never comes at the right time.

SYSTEM PLANNING. It's no joke to be caught with your plant down . . . through failure to anticipate future needs. Look ahead *now* to future needs. Remember that delivery and installation of new equipment take time . . . often up to two years. System planning prepares for potential increase in business.

SINGLE SOURCE. Many cable installations suffer from improper jointing and terminating. Poor design, inadequate materials, wrong methods, or all three are responsible. The cable and its accessories should be considered together. When the combination is furnished by one supplier, the responsibility for correct materials lies with him alone. It also saves time in placing orders.

LIGHTING CIRCUIT POINTERS. Spare lighting capacity is important. Plan carefully for future growth of the lighting system or increased illumination intensities. Consider fixtures to be used. Starting current on some types of units (high intensity mercury vapor) is higher than operating current. Use a minimum of No. 12 wire for all lighting circuits. Keep voltage drop within one percent.

in the years between now and 1956 . . .

which conductor shall it be for America's electric power expansion?

COPPER or ALUMINUM

Some will choose copper . . . some aluminum . . . some both.

Whatever your final choice—it will always pay you to specify ANACONDA . . . because here is a *single* source of supply for:

copper and aluminum insulated cables
copper and aluminum service cables
copper, aluminum and copperweld bare and weatherproof
copper and ACSR transmission and distribution

Here, in the making of conductor, jacket, insulation and the entire cable, modern manufacturing techniques are backed by years of field engineering and construction experience. Metallurgical and development facilities are the most up-to-date.

FOR FURTHER INFORMATION about any product mentioned in the pages of this advertisement, see your Anaconda Representative . . . or write to *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

ANACONDA®

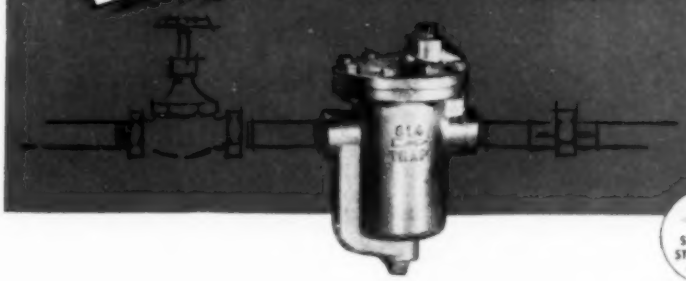
TODAY'S HEADQUARTERS FOR WIRE AND CABLE

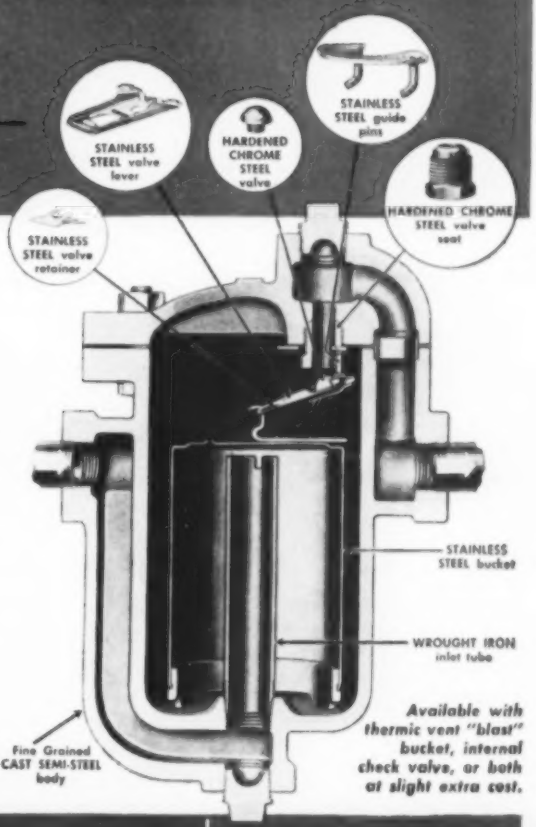
MAKERS OF building, barn, machine tool, control and communication wire • service and overhead distribution cables, bare and weatherproof including ACSR • portable cords and cables • power and bus-drop cables • mine, bridge, aerial, underground, duct, network and submarine cables • parkway, airport and street-lighting cables station, apparatus and vertical-riser cables • magnet wire • copper, aluminum and copperweld conductors • wire and cable accessories.

NEW

ARMSTRONG No. 814

. . . a side inlet-side outlet steam trap with 1" or 1¼" pipe connections!




STAINLESS STEEL valve lever
HARDENED CHROME STEEL valve
STAINLESS STEEL guide pins
HARDENED CHROME STEEL valve seat
STAINLESS STEEL valve retainer
STAINLESS STEEL bucket
WROUGHT IRON inlet tube
Fine Grained CAST SEMI-STEEL body

Available with thermic vent "blast" bucket, internal check valve, or both at slight extra cost.

NOW, with the addition of the No. 814, you have a choice of five sizes of Armstrong side inlet-side outlet traps from ½" to 1¼" for use wherever horizontal and opposite pipe connections will make the simplest hookups. Bottom inlet-top outlet traps are available in the same size range, so that for the majority of all condensate loads you can use the body style that best suits the job.

Capacity of the new No. 814 is 6500 lbs./hr. at 125 psig.; height 13⅝"; face to face dimension 8"; weight 45 lbs.; price $46.00 list.

For complete data on the No. 814 and other Armstrong traps, call your Armstrong Representative or mail the coupon today.

ARMSTRONG MACHINE WORKS
806 Maple St., Three Rivers, Mich.

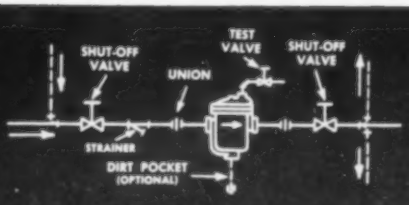


FIG. 1. Standard hookup for side inlet-side outlet traps.

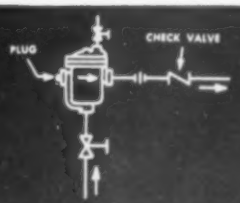


FIG. 2. Alternate hookup with inlet at bottom.

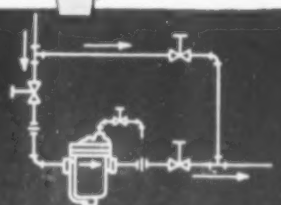


FIG. 3. Bypass hookup for side inlet-side outlet traps.

HOW TO ORDER:

Refer to Armstrong Catalog J, Sweets' Plant Engineering or Industrial Construction Files or Chemical Engineering Catalog. Capacities of the 814 are identical to the 214 trap listed in these Catalogs. Other data are given above. Specify trap number, pipe connections and maximum operating pressure.

ARMSTRONG MACHINE WORKS
806 Maple St., Three Rivers, Mich.

- ☐ Send complete data on No. 814 trap.
- ☐ Send Catalog J listing all Armstrong traps.
- ☐ Have Representative call.

Name_____

Company_____

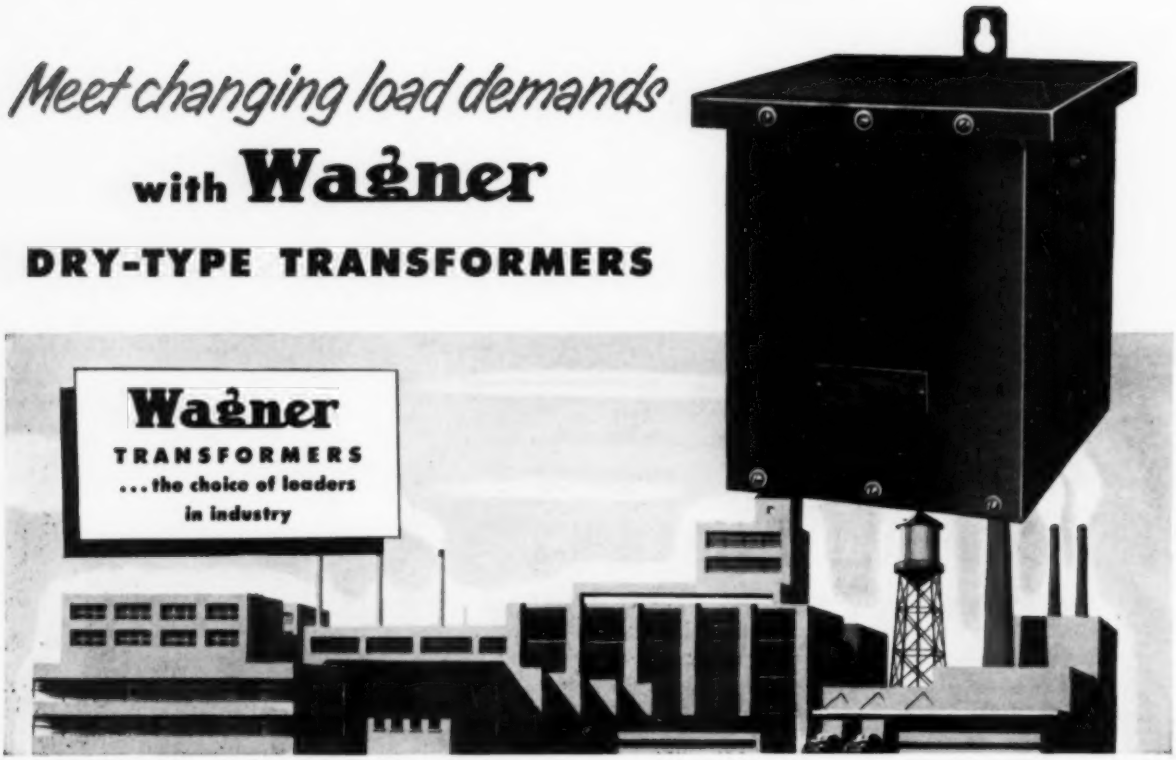
Street Address_____

City_____ Zone____ State_____

Meet changing load demands

with Wagner

DRY-TYPE TRANSFORMERS

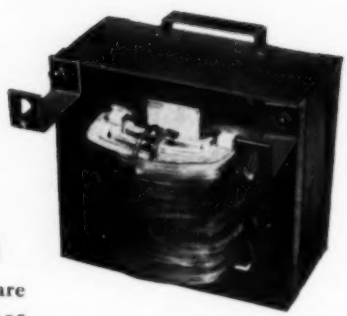


Wagner dry-type transformers can solve your problems by putting the right voltage close to the load wherever machines, portable tools or lights require voltage changes.

SAFE- Wagner dry-type transformers meet all requirements for indoor installation. They will save you money on insurance premiums. Fireproof vaults or other special protection are unnecessary—even where fire hazards are present.

ECONOMICAL- When you use Wagner dry-type transformers, you reduce installation costs—you reduce line losses—you eliminate long runs of secondary copper—and you can forget about maintenance.

COMPACT- Wagner dry-type transformers are small in size—light in weight—easy to install and easy to move whenever changes in plant facilities make it necessary.



Form W

Core and Coil

These transformers are built in the Wagner Form W design with cores of cold rolled oriented grain transformer steel which permits less weight per kva and small size cases for space-saving installation.

80° C Rise — Class B Insulation

Safe operation is assured through the use of class B inorganic insulation throughout the coil structure. Liberal ventilating ducts provide high short time overload capability. Available in sizes 3.0 to 100 kva, 600 volts and below.

WAGNER ELECTRIC CORPORATION
6383 Plymouth Ave., St. Louis 14, Mo., U.S.A.

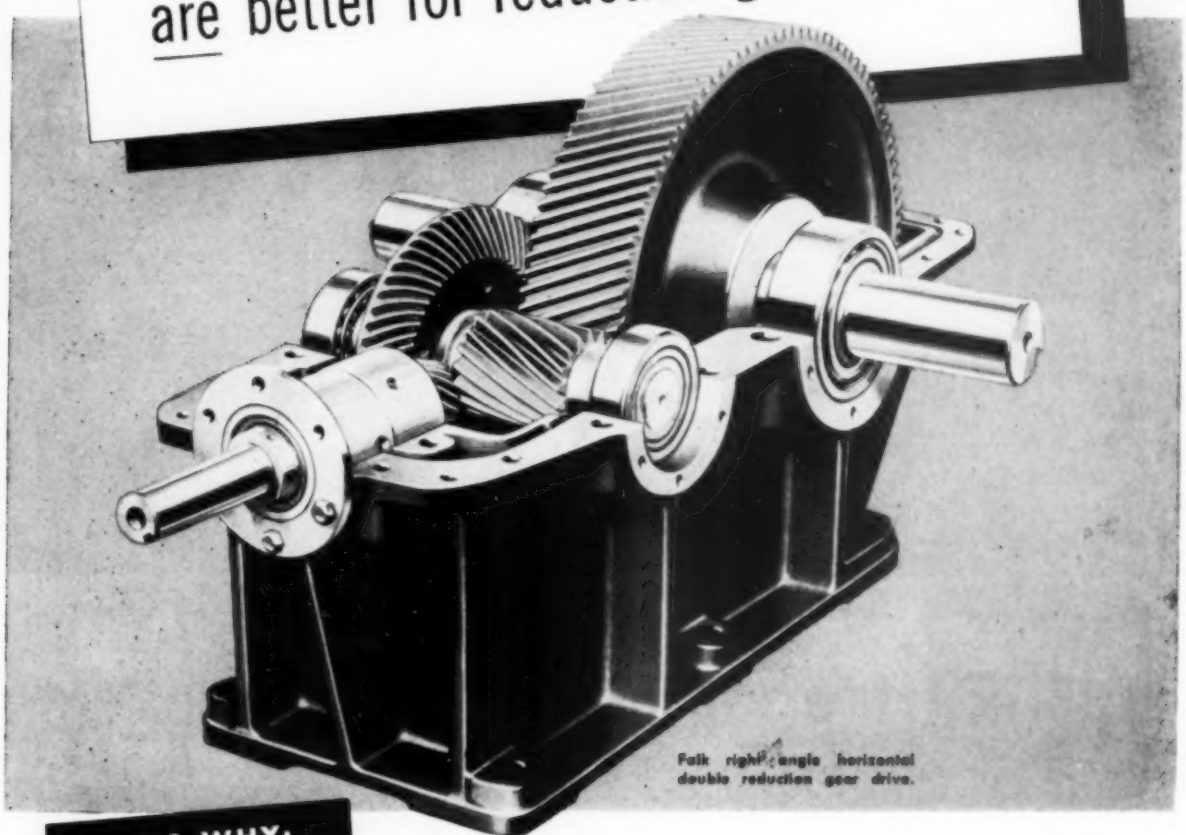
® Wagner Electric Corporation EST. WE 1891

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

T53-7

Yes, GULF E. P. LUBRICANTS are better for reduction gear drives:



Falk right angle horizontal double reduction gear drive.

HERE'S WHY:

1. **Good anti-weld properties**
2. **Noncorrosive**
3. **Extra tacky**
4. **Stable**
5. **Good rust preventive properties**

For cooler running gear drives, freedom from scoring caused by faulty lubrication, and for protection against corrosion, select Gulf E.P. Lubricants for your speed reducers and increasers.

Gulf E.P. Lubricants provide better tooth protection. And it is often practical to use a Gulf E.P. Lubricant of lower viscosity than is possible with a straight mineral oil, which may mean that fewer grades of gear lubricants are required.

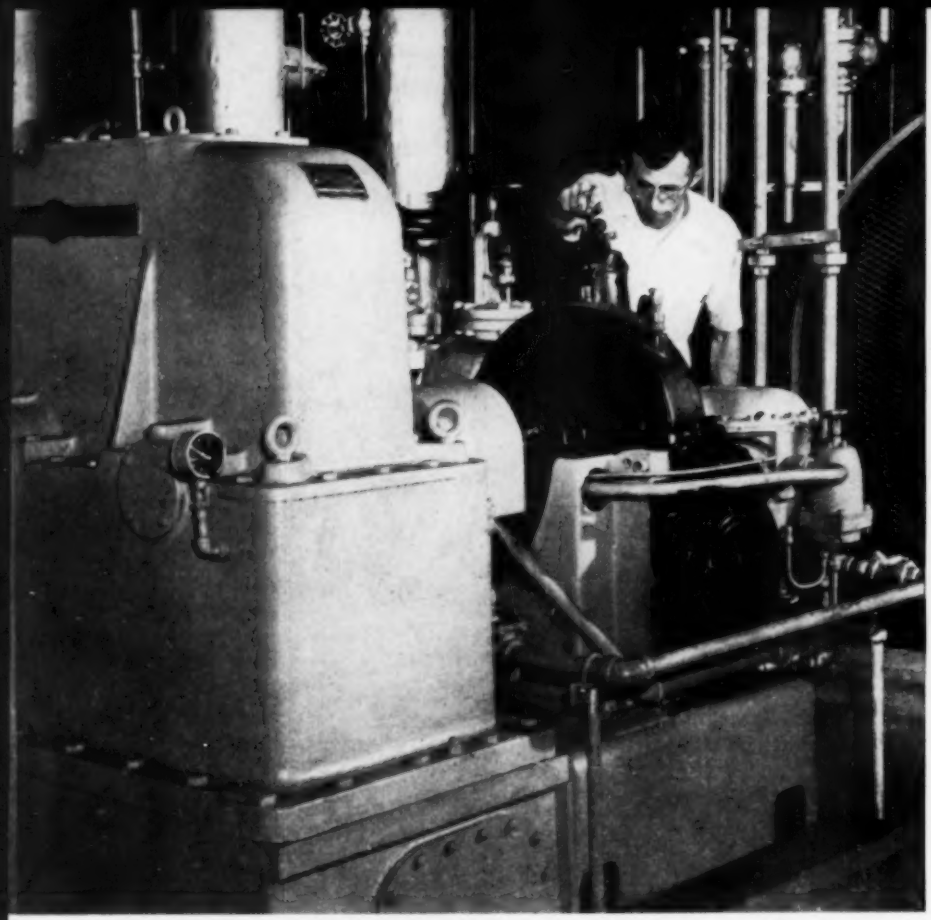
For additional information on these superior gear-drive lubricants, send the coupon below.

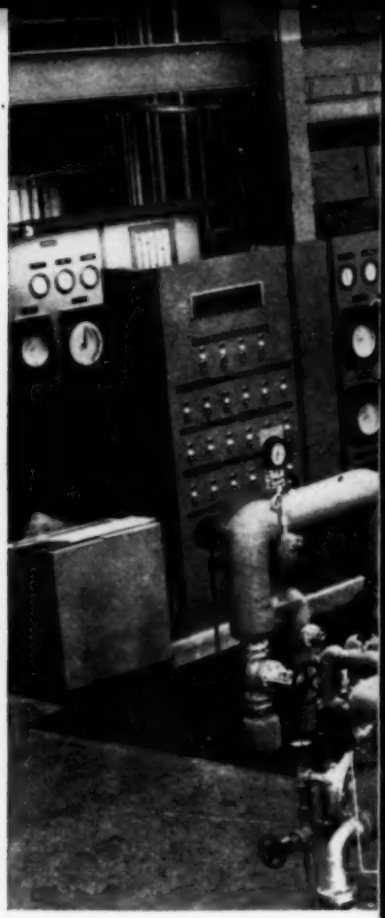
GULF SERVES INDUSTRY

Gulf Oil Corporation • Gulf Refining Company
1934 Gulf Building, Pittsburgh 30, Pa. SPI

Please send me, without obligation, a copy of your pamphlet "Gulf E.P. Lubricants for Reduction Gear Drives."

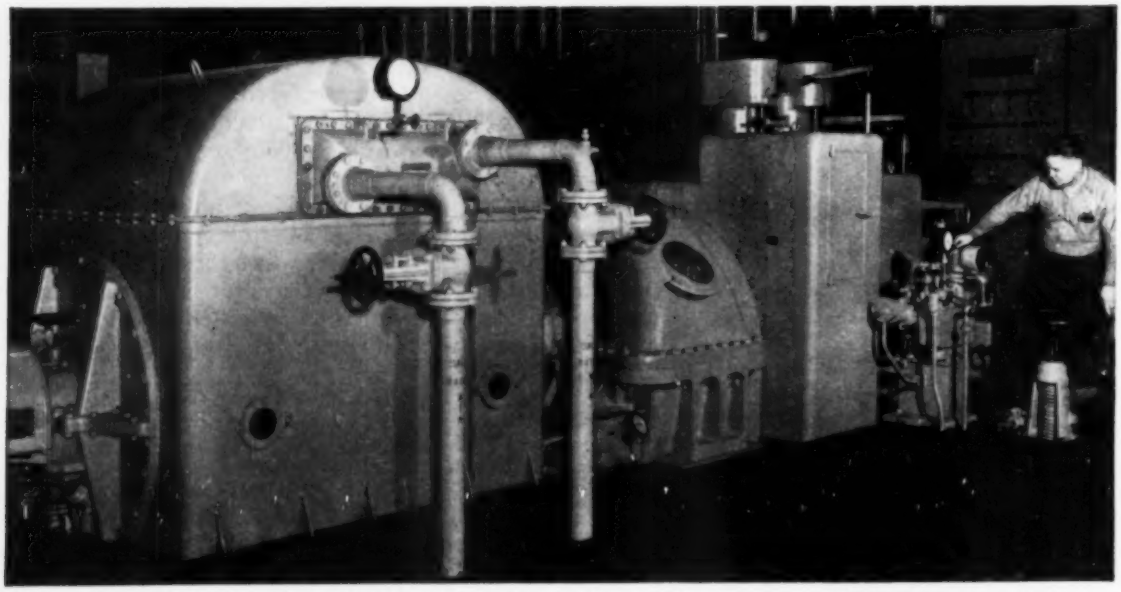
Name .....
Company .....
Title .....
Address .....



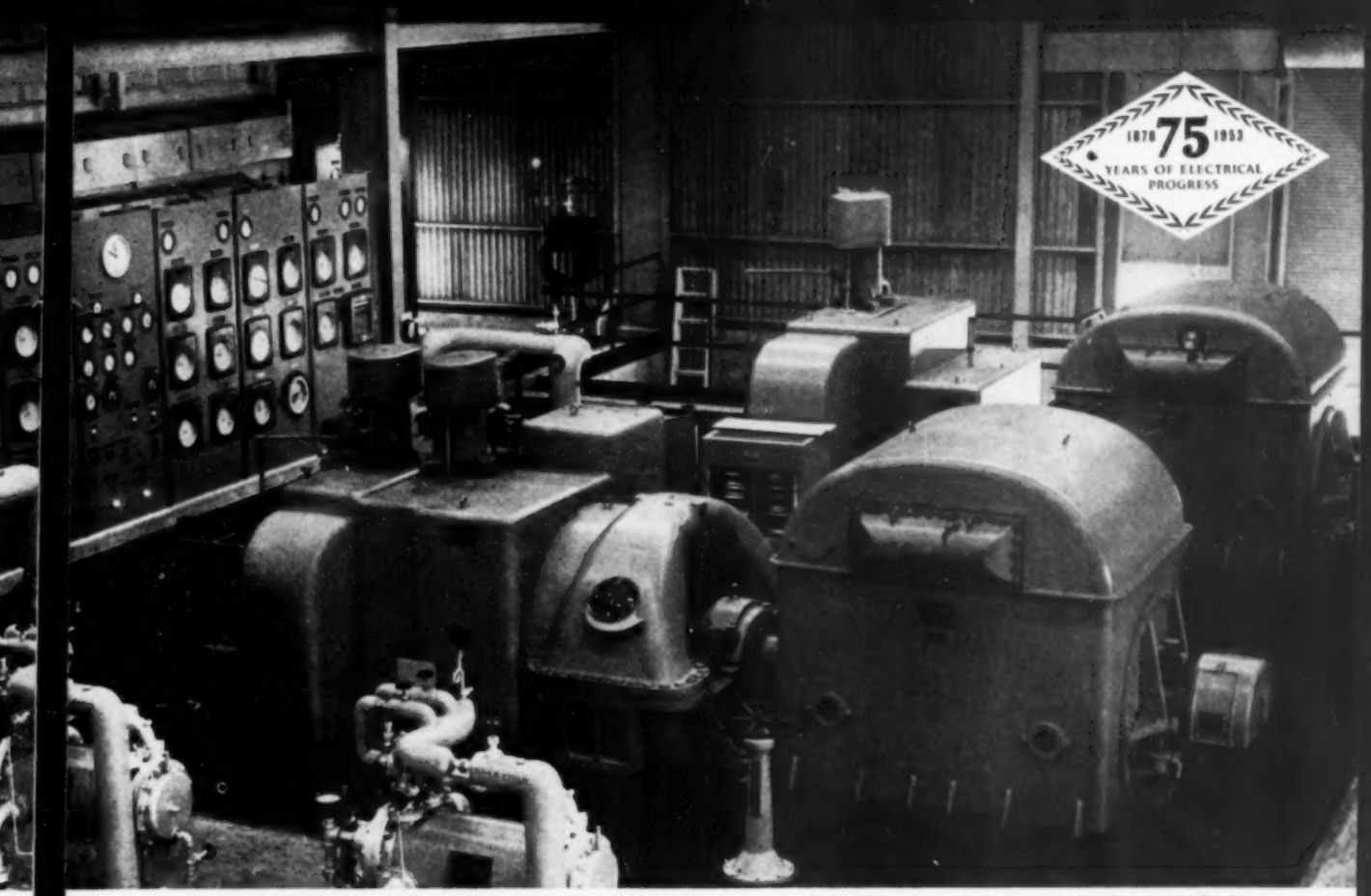


G-E TYPE DP MECHANICAL-DRIVE TURBINE, rated 135 hp, drives standby air compressors. J. A. Chamberlain, Supervisor of Utilities at Barber Refinery, checks turbine.

G-E Turbines Maintain Plant Steam



EASY STARTING of the General Electric 2000 KW double extraction turbine-generator at California's Refinery is demonstrated by W. E. Riley, Station Operator. Handwheel initiates small pilot valve, requires almost no muscle effort to operate.



DOUBLE-EXTRACTION CONDENSING TURBINE-GENERATOR in foreground supplies process steam at 150 psig and 15 psig for refinery operations at "California's" Barber, New Jersey plant. Other turbine is straight condensing.

Balance at "Calso's" Barber, N.J. Refinery

2000 KW Turbine-generators Reduce Boiler Steam to Process Pressures; Mechanical-drive Turbine with High-speed Precision Gear Drives Utility Air Compressor.

To make fullest use of available high-pressure steam, to obtain economical by-product power, and to automatically maintain plant steam balance over a wide range of steam flows, the California Refining Division of The California Oil Company selected two General Electric turbine-generators for its Number Two plant at the Barber, N. J. Refinery.

Extraction steam from one turbine-generator, a 2000 KW unit, is delivered at 150 psig and 15 psig for various process uses. Turbine governing accuracy is such that even when extraction steam or electrical load requirements vary, extraction pressures are held constant. A second 2000 KW unit exhausts to a condenser.

The "California" Refinery also installed a General Electric Type DP mechanical-drive turbine with a G-E high-speed precision gear to drive one of the compressors which furnishes utility air for use throughout the refinery. In an emergency, this turbine-driven compressor could meet complete compressed air demands.

If your plant uses process steam, why not take advantage of G.E.'s experienced turbine engineering resources. G-E engineers will study and recommend ways for you to best utilize steam supply. Get more for your turbine dollar with G-E turbine-generators. General Electric, Schenectady 5, N. Y.

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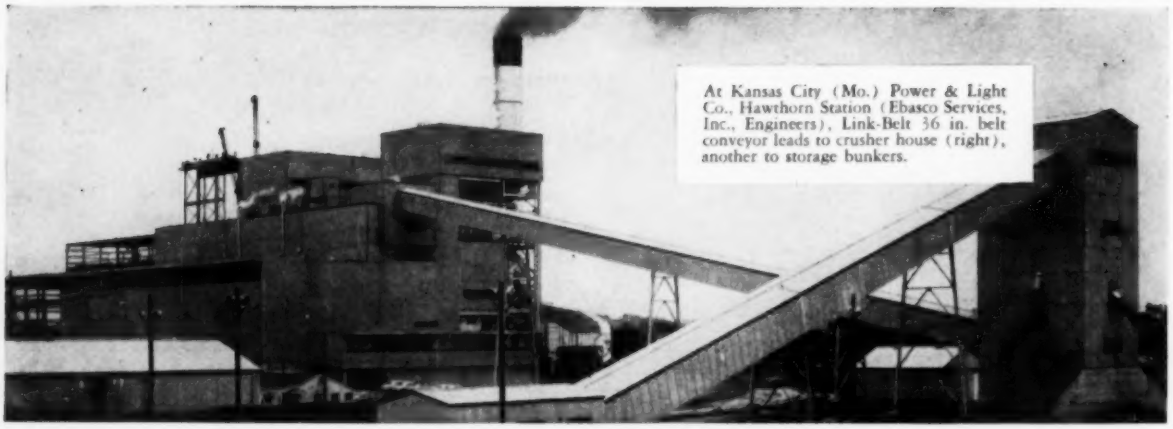

At Kansas City (Mo.) Power & Light Co., Hawthorn Station (Ebasco Services, Inc., Engineers), Link-Belt 36 in. belt conveyor leads to crusher house (right), another to storage bunkers.

For the best in coal handling look to LINK-BELT

IN many power plants—large and small—Link-Belt engineers have met practically every type of coal handling problem. This vast experience, combined with the most complete line of coal handling equipment, is your assurance of the right system for your needs. Our engineers will work with you and your consultants—help you cut coal handling costs to a minimum. Write for 44-page Book 2410, containing drawings and photographs of many outstanding coal handling systems.

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COAL HANDLING EQUIPMENT

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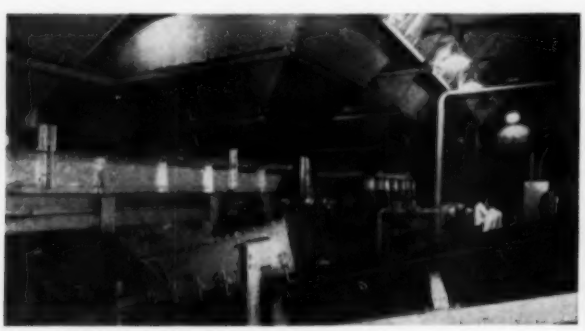
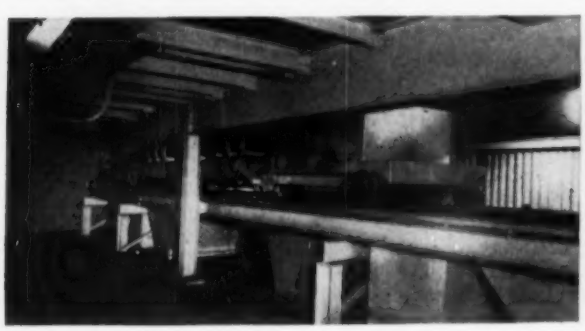
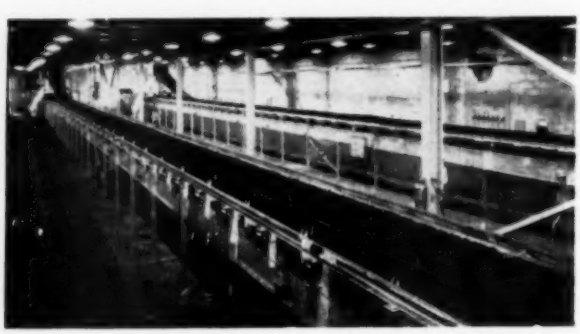


Two Link-Belt double reciprocating feeders empty track receiving hoppers. Two belts feed another leading to crusher house.

One of two Link-Belt belt conveyors emptying track hoppers. At right, belt feeders deliver coal from reclaim hoppers.



Shuttle belt transfers coal to distributing belts or storage bunkers directly. System handles 450 tph with provision for 900 tph.



Self-propelled trippers have bunker seals. Drag chains in steel enclosures collect dribble from conveyor's return run.

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TURNBUCKLE

Socket only for split ring fig. 1108 ⅜ to ⅞ in. rod

Weldless eye nut fig. 290 ⅜ to 1½ in. rod

Forged steel clevis fig. 299 ⅜ to 1⅜ in. rod

Turnbuckle drop forged steel fig. 230 ⅜ to 1½ in. rod

Rod coupling fig. 136 ⅜ to ⅞ in. rod

Adj. swivel coupling fig. 134 ⅜ to ⅞ in. rod

Turnbuckle adjuster fig. 114

Rod coupling fig. 208 toggle bolt fig. 209 ⅜ to ⅞ in. rod

U-HANGERS
EXTENSION
CEILING PLATE

Standard U bolt fig. 137

Adj. wrought U pipe hanger fig. 252 ⅜ to ⅞ in. rod

Extension piece fig. 157 ⅜ to ⅞ in. rod

Spring Ceiling plate fig.133 ⅜ to ⅞ in. rod

ASSEMBLIES

Split ring with socket and coach screw

Split ring, socket and ceiling flange

Extension split ring hanger fig. 139

Adj. swivel ring with coach screw fig. 100

Adj. clip hanger fig. 106

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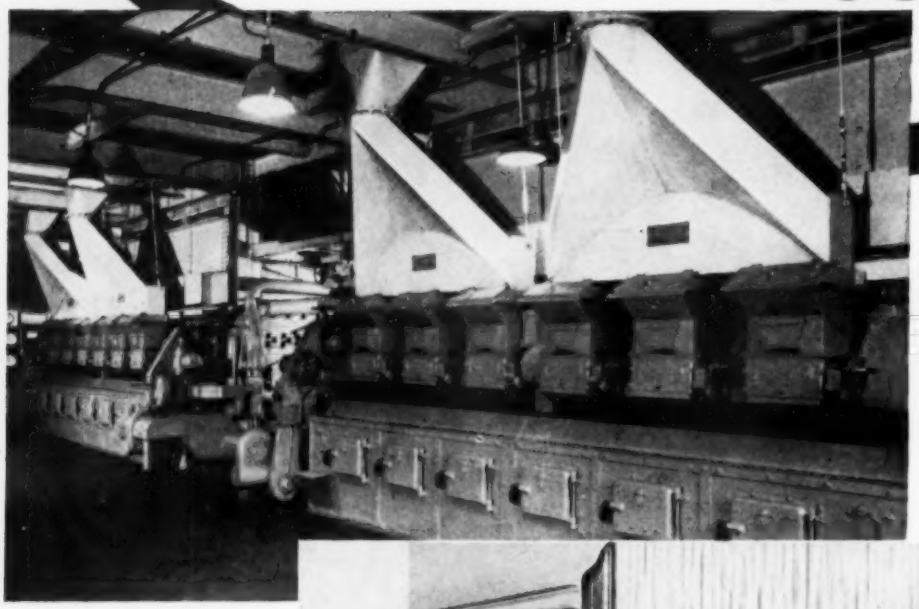
Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems

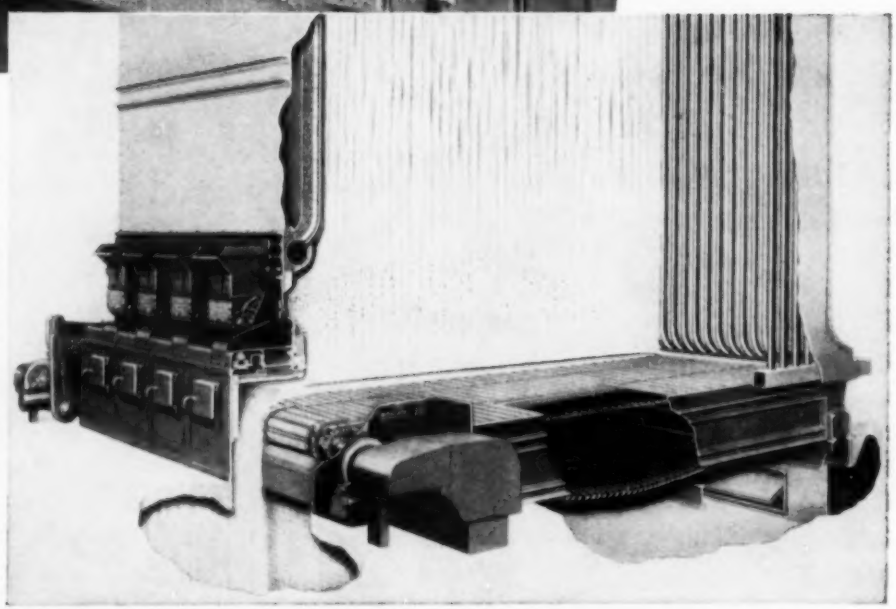
Detroit Rotograte Has You Need



Typical installation of Detroit RotoGrate Stokers in prominent Midwestern Plant. Units designed for capacities of 150,000 pounds of steam per hour each.

Cut-away view of a typical water cooled furnace of a steam generator. Two feeders are removed to show the specially designed overlapping grate that moves slowly forward to continuously discharge the ash at the front. A scientifically designed reinjection system provides effective furnace turbulence.

Detroit RotoGrate Stokers may be applied to all types and makes of boilers or steam generators, and are available for capacities up to 400,000 pounds of steam per hour per unit.



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- Pacific Mills
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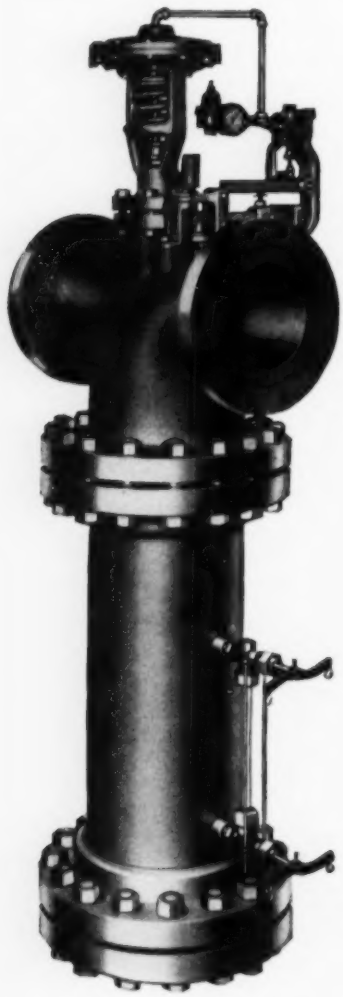
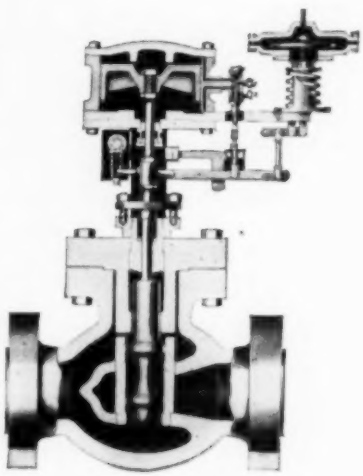


WHEN you select your pressure reducing and desuperheating station, you'll pay more if you buy COPES. But if your job is a tough one, you'll find COPES cheapest in the long run. You'll be money ahead in installation, operation and maintenance costs, and you'll be getting *accurate* control—even down to your lightest loads, not just at your normal flows.

You'll get *quiet* operation—avoiding annoying chatter and destructive vibration.

You'll get 'round-the-clock dependability for years to come—with any adjustments or maintenance easily handled by your plant personnel.

It all adds up to the kind of performance you need for your tough jobs—results you cannot expect if you buy on price.



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You'll find it easy to install the self-contained COPES Desuperheater. It goes into the line as a unit, with only three connections. All accessories are furnished. You need no extra steam atomizing valve with extra stop valves—no long run of alloy-steel steam piping—no extra piping from the temperature element to the spray nozzle—no other extras.

You'll also find your COPES Desuperheater correctly sized for low velocities—for minimum noise, vibration and wear. You'll find temperature control accurate—even on lightest flows—because cooling water is controlled and completely atomized inside the mixing chamber. Adjustment is simple and permanent.

The COPES REDUCING VALVE

You'll find your COPES valve ports accurately designed for the correct capacities under the flow and pressure conditions you specify. You'll have no "hunting" to upset the precision of your control.

You'll find extra-heavy construction throughout. The valve piston is supported and guided in the areas subject to greatest velocities and forces. If these forces could cause excessive erosion, Stellite is welded to all contact surfaces before they are precision-ground to correct clearance for your installation. You'll find design and construction minimizes the possibility of sticking, leaking or vibrating. You'll suffer no objectionable noise.

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HIGHGROVE, CALIFORNIA. California Electric Power Company's new, modern 60,000 KW steam-electric generating plant now in commercial operation here was designed, engineered and constructed by The Fluor Corporation, Ltd. Many design innovations make this plant one of the most unique in existence. Except for the control rooms and switch gear the plant is completely outdoors and was planned for operation with an absolute minimum of attending personnel. The entire job was completed in advance of the originally scheduled operating date notwithstanding the extreme difficulty of obtaining some items of material and equipment. Additional units are being added to bring the total output to 140,000 KW. Fluor's ability to build efficient power plants has been ably demonstrated many times and is recorded in the illustrated brochure, "The Highgrove Story." Copies are available upon request. Fluor's broad experience also extends into the design and construction of all types of facilities—from the smallest unit to the largest—for the petroleum, natural gas, chemical, petrochemical and heavy industries anywhere in the world.

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"Under the Hammer?"

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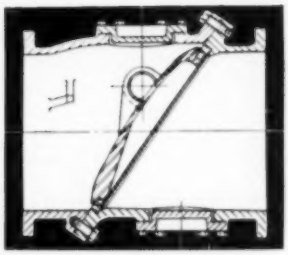
CHAPMAN *Tilting Disc* CHECK VALVES

Loosened pipe-joints are caused by hammering. And hammering is caused by valve-slam. But when a valve can't slam under usual piping arrangements . . . then you're free from the danger of line damage.

And this is all because of the Chapman Tilting Disc, with specially designed airfoil section that means light weight, and perfect balance in the open position, so it is easily held open in the flow . . . and then dropped quietly to a *cushioned closing* that does not even jar the line.

That's why certified tests from the country's top engineering schools and actual installations prove that Chapman Tilting Disc Check Valves reduce head-loss over regular swing-type checks. Check these tests for yourself . . . write for Catalog No. 30.

The Chapman Valve Mfg. Co.
INDIAN ORCHARD, MASSACHUSETTS



Cross-section of the Chapman Tilting-Disc Check Valve. A feature of the design is that the disc seat lifts away from the body seat when opening, and drops into contact when closing, with no sliding or wearing of the seats.

Timely Comments

Regional Conference Tackles POLLUTION PROBLEMS

SASI Explores Industrial Waste Problems in New Orleans Meeting

TOP AUTHORITIES on waste disposal practice from industry, governmental agencies and other key professions related to the subject met in New Orleans the latter part of April to discuss means by which the South can avoid the acute air and stream pollution problems which have been encountered in other regions experiencing rapid industrialization.

James F. Crist, president of the *Southern Association of Science and Industry*, made the keynote address. Mr. Crist, president of the Gulf Power Company, Pensacola, and vice president of The Southern Company, Birmingham, emphasized that there is a great diversification of functions involved in pollution problems.

The word disposal is not synonymous with pollution. Pollution is a condition created by improper disposal. When a plant disposes of its refuse prudently, only the factory management is concerned, but when the surroundings are polluted with such wastes and the rights of others are affected, management cannot escape liability. The public then desires equity.

Pollution is Bad Business

Industry has found that it pays to create a good impression on customers, employees and the general public. Foresighted managements are constantly striving to improve their public relations. The establishment of reasonable equity in the disposal of manufacturing wastes is essential to the maintenance of such relations.

Mr. Crist also noted that with the great and continuing industrialization and development of the South, it cannot be expected that our streams will retain their primeval purity nor that our air will be as clear and clean as that on the mountain tops. This would mean the abandonment of our industrial goals. The problem is how to attain these goals, so that equity exists for all our citizens; so that the public's rights are protected and industry is not burdened with unreasonable expenditures.

The South is blessed with a wealth of natural resources. Foremost among these are its great river systems. Yet indifference or the failure to live up to our own responsibilities for waste disposal could soon destroy this priceless asset.

Municipalities, too, must face up to this responsibility, according to Mr. Crist. They must provide adequate sewage treatment facilities if our streams are to be kept useful for industrial and other purposes. This becomes more apparent as further industrial development places a greater load on the streams of the South. Any well-coordinated program of water resource development will include the provision of suitable treatment plants in all major communities.

Industry Wide Program

Few industries are so fortunate as to escape some type of waste problem. About one-third of all new manufacturing plants must cope with a significant disposal problem. New multi-million dollar plants are being added in the South at a rate of one each working day—more than 300 per year. This means that at least 100 major waste disposal problems must be solved each year. If they are not properly solved we can accumulate a great number of bad situations within a few years.

Industry Growth Main Objective

Mr. Crist, SASI President, pointed out that the continued rapid growth of many major Southern industries may be dependent on satisfactory solution of waste problems. Fortunately, the South is being developed at a time when advanced technological methods are available for solving many industrial waste problems. While there are many others for which satisfactory solutions are not yet available, we can, by applying available information, greatly reduce or eliminate pollution problems in our industrial areas.

"We are primarily interested in promoting the further industrial development of the South. We want to continue to bring new industries into the South and to expand the industries that already exist here. We do not want to impose any unnecessary restrictions or regulations on any of our industries, old or new. Our interest is in promoting the exchange of information whereby the business community and the public can enjoy the mutual benefits of an improved economy and a higher standard of living.

"There are many industries and many municipalities in the South which have faced squarely the waste and pollution problem and are effectively coping with it. We salute them and they deserve to rank among our first citizens."

Fig. 1603 W. E. 600-pound Cast Steel Pressure Seal Gate Valve with welding ends. A Powell design for the modern Power Plant. Also made for 900, 1500, and 2500 W. S. P.

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It may not be one of the "Four Freedoms" but freedom from worry is greatly to be desired. In flow control equipment you can have this freedom with Powell Valves—the valves with a record for long, dependable performance with minimum maintenance.

The Wm. Powell Company
Cincinnati 22, Ohio

DEPENDABLE VALVES SINCE 1846

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BRONZE, IRON, STEEL AND CORROSION RESISTING VALVES

Industry Speaks

SOUTHERN POWER AND INDUSTRY

THE SEVEN MISSING KEYS TO ABUNDANCE

Adapted from comments by *Robert S. Lynch*, President, *Atlantic Steel Company*, Atlanta, Georgia, at the March 27th meeting of the *American Steel Warehouse Group* in Jacksonville, Florida.

OUR STEELS of today are not the steels of earlier American history. They are special steels designed for a multitude of special purposes. Without them we cannot carry on our particular kind of civilization.

There is a phase of our raw materials supply that poses a vital problem. Several alloying ores are absolutely vital to make the steels we require for our modern machines. Seven of them we call the "Seven Missing Keys to Abundance" because we rely on imports to meet our requirements.

The seven missing keys are: manganese, vanadium, chromium, cobalt, columbium, tungsten, and nickel. Useful, but not as important as these seven are molybdenum, titanium, zirconium, and germanium. We must import between 50 and 100 per cent of our requirements for these items. From this aspect, we are a HAVE NOT nation.

Cobalt—practically our entire supply—90 per cent of it—comes from Africa, the Belgian Congo. That is very far away, across a lot of ocean.

Chromium—from South Africa and Southern Rhodesia. Marshall Plan aid funds have aided in bringing smaller quantities out of Cuba, the Philippines, and Turkey.

Columbium—from Africa, Nigeria and the Belgian Congo.

Vanadium—we produce two-thirds of what we need, but the important balance must come from Africa and Peru.

Tungsten—all of it once came from China and North Korea, but those doors are closed. We are forced to turn to such scattered sources as Siam, Japan, Peru, and Brazil.

Nickel—vast quantities are used and historically we have imported it all from Canada. Recently, a great nickel plant in Cuba that served us during World War II has been reactivated and is now producing for us.

Manganese—used to come from Russia where the doors are now closed. We turned to India, Union of South Africa, and the African Gold Coast, Brazil and Cuba. India and Africa furnished about 90 per cent of our requirements.

The nation, of course, is stockpiling these materials. We are constantly hunting for substitutes. We are conserving, and we are using the latest technical advances. Perhaps the day will come when we will be able to produce all the types of steel we want without recourse to these missing keys to abundance.

The average man reads and hears the news with a map of the world close by. We scan the papers daily for news about Malenkov of the Soviet, Moa of China, Nehru of India. We watch South Africa and its Afrikander and Mau Mau problems. We also watch South America for possible Communist infiltration.

What Can We Do About It?

We can be more careful of our human relations with the peoples around the world—people whose territories are vital roots of supply for our own industry—people who produce for us, who start vital supplies on the way to us.

We have a new dependence on the friendliness of other peoples, whose territories we are now mining. South Americans, in lands like Venezuela, do not feel so close to "Yankee people," as they call us down there. We have seen recently, in connection with oil, how quickly misinterpretations of our Yankee work and projects can fan latent passions, and perhaps become backgrounds to demands for nationalization.

Similar situations exist in Liberia, India, and Africa. These are human situations that must never be forgotten, which must be handled with continuing tact and understanding—and even self-effacement, which is one of the most difficult things Americans have to learn.

The Point-4 program of our foreign policy was set up to help these backward, under-privileged countries. The millions spent on this foreign aid program is some degree of insurance of a continued flow of these important alloying metals.

One of the best auguries for the future, and for the protection of our way of life is that a number of great American companies who are engaged in opening up the new resources of the world, are, at the same time, working hard and conscientiously to raise the standard of living in the areas where they operate.

As new skills are created among the native workers, new wealth is pouring in. Hospitals are being built, and schools, and recreation centers. The standard of living in these scattered areas is coming up. Given time, this effort alone will act to insure against communist infiltration.

When given a freedom of choice, people normally do the right thing. We must do whatever we can to help these people to enjoy the freedom and liberty we enjoy under our Constitution. If we pursue this policy conscientiously and relentlessly, our way of life, even in darkest Africa, will most surely win.

PLASTIC PIPE

Selection—Application Data

By RAYMOND B. SEYMOUR and EARL A. ERICH

Atlas Mineral Products Co., Mertztown, Pa.

▶ Plastic pipe is superior to other types of pipe in some respects. It is economical, offers little resistance to liquid flow, has low electrical conductivity, is light in weight, has fair resistance to impact and good resistance to chemicals.

▶ Thermoplastic type pipe is satisfactory at temperatures up to 150 F, and when armored with steel or thermosetting plastics is good up to 190 F. Thermosetting plastic pipe can be used to transport boiling solutions.

▶ In spite of some 20 years' successful experience in Europe, plastic pipe is relatively new in this country. But the amount used will double every two years during the next decade. It is anticipated that 75 million pounds of plastic pipe will be purchased by American industry in 1960. This article should supply sufficient basic information to permit plant engineers and maintenance men to select and use plastic pipe correctly.

WITHIN the next ten years, American industry will be purchasing plastic pipe at the rate of 75 million pounds annually. This amount coupled with accumulated purchases from previous years will be relatively small when compared with steel pipe. Nevertheless, the industrial use of plastic pipe has already reached the point where plant engineers and maintenance men require additional knowledge to guide them in selection and maintenance.

Types of Pipe

As in the case of other plastics, pipe may be classified on the basis of whether it is **thermosetting** or **thermoplastic**. The thermosetting

Emphasizing the strength of 6 in. i.p.s. heavy wall rigid P.V.C. (polyvinyl chloride) pipe

type has been used for many years in industry but its use will not increase as rapidly as that of thermoplastic pipe. Thermosetting pipe will withstand higher temperature, is more resistant to solvents, is less flexible and more expensive than thermoplastic pipe. The definition is not as clear-cut as one might surmise. There are cases in which pipe is manufactured from blends of thermoplastic and thermosetting materials and a recent development makes use of thermosetting pipe to armor thermoplastic pipe.

Pipes based on phenolic, furane and polyester resins are thermosetting and cannot be formed or softened by temperatures as high as 300 F. Pipes based on polymers of vinyl chloride, vinylidene chloride, styrene or ethylene and cellulose acetobutyrate are thermoplastic. They are usually manufactured by the extrusion process and are readily softened by immersion in boiling water. They are poor conductors of heat and electricity, are readily fabricated, have good resistance to impact and offer low resistance to the flow of hydraulic fluids.

Commercial thermoplastic pipe is usually classified as flexible, semi-rigid and rigid. These types may be subdivided further into virgin and reprocessed material. However, since reprocessed material cannot be well-defined, this discussion is limited to top quality virgin pipe. The most widely known flexible plastic type pipe is made from polyethylene. Filled polyethylene and some varieties of cellulose acetobutyrate are classed as semi-rigid. Most pipe made from cellulose acetobutyrate, high impact styrene, Saran and polyvinyl chloride is classed as rigid. This class is further subdivided into Type I, consisting of at least 95 per cent polyvinyl chloride, Type II, consisting of at least 85 per cent polyvinyl chloride, and Type III, modified consisting of at least 70 per cent polyvinyl chloride.

THERMOSETTING PIPE

Asbestos-Phenolic Pipe

Pipe made from mixtures of asbestos and phenolic resin has been available commercially for many years (1, 2). This pipe has been used to convey acids, corrosive salts and many solvents at temperatures up to 200 F. However, cast asbestos-phenolic pipe is unduly heavy and is not resistant to alkalies or oxidizing acids, such as nitric acid.

Because asbestos-phenolic pipe is manufactured by the casting process, manufacturing costs are high and these costs are reflected in the selling price of the pipe itself. Such pipe is available in 4 to 10 ft lengths in sizes varying from ½ in. to 12 in. inside diameter. It is usually joined by a split metal flange held in place by a tapered groove which obviously weakens the pipe. This pipe is also available in bell and spigot ends.

Asbestos-Furane Pipe

The inherent lack of alkaline resistance of phenol-asbestos pipe is

TABLE I—Relative Cost per Lineal Foot for Various Types of Pipe (Listed in Order of Increasing Costs)

Steel, Cast Iron, Asbestos Cement, Polyethylene, Cellulose Acetobutyrate, High Impact Styrene, Polyvinyl Chloride, Saran Tubing, Aluminum, Poyester, Glass.

Brass, Asbestos Furane, Asbestos Phenolic, Lead, Porcelain, Hard Rubber, Saran Lined Steel, Rubber Lined Steel, Stainless Steel, Duriron, Glass Lined Steel, and Durimet.

TABLE II—Comparative Physical Properties of Plastic Pipe

Type	ASTM D 792 Specific Gravity	ASTM D 638 Tensile Strength (psi)	ASTM D 790 Flexural Strength (psi)	ASTM D 696 Thermal Expansion x 10^{-5} (in./in./°C)	Max Useful Temp. (°F)	ASTM D 256 Impact (Ft-lb/in./ Notch, Izod)
Asbestos Phenolic	1.7	4,000	6,500	3	250	0.4
Asbestos Furane	1.75	4,000	7,500	3	250	0.5
Polyester	1.7	10,000	35,000	2	250	15
Polyethylene	.95	1,400	1,700	18	125	High*
Cellulose Acetobutyrate	1.2	5,000	5,800	13	120	1.5
Saran	1.7	5,000	16,000	19	150	1.5
High Impact Styrene	1.04	4,000	6,500	8	150	9
Polyvinyl Chloride	1.4	9,000	16,000	7	150	0.6

NOTE: * Does not break.

TABLE III—Comparative Chemical Resistance of Plastic Pipe at 77 F.

Type	Water	10% Caustic	10% Sulfuric	70% Sulfuric	10% Nitric	Sea Water	5% Chlorite Bleach	Gasoline	Benzene	Trichlor-ethylene
Asbestos Phenolic	E	P	E	E	F	E	F	E	E	E
Asbestos Furane	E	E	E	F	P	E	P	E	E	E
Polyester	E	F	E	G	G	E	E	E	G	P
Polyethylene	E	E	E	E	E	E	E	F	P	P
Cellulose Acetobutyrate	E	F	G	P	P	E	F	E	F	P
Saran	E	F	E	E	E	E	G	E	F	P
High Impact Styrene	E	E	E	G	G	E	E	E	P	P
Polyvinyl Chloride	E	E	E	E	E	E	E	E	F	P

LEGEND: E—Excellent F—Fair—should be tested.
G—Good P—Poor—not recommended.

overcome through the substitution of furane resins for phenolic resins. Asbestos-furane pipe has essentially the same physical properties as asbestos-phenolic pipe. In addition to resistance to alkalies, it is also resistant to salts, acids and solvents but is somewhat less resistant to dilute nitric acid and other oxidizing solutions (3, 4).

More recently, a stronger and lighter furane pipe has been manufactured through the use of woven Fiberglas in place of asbestos as a reinforcing agent for the furane resin (5). Joints as corrosion resistant and as strong as the pipe itself have been secured by butting straight end pipe and wrapping with Fiberglas impregnated with furane cement. Some progress has been made in the substitution of epoxy resin for furane cements in the production of asbestos-filled pipe. Such materials have essentially the same resistance as the furane cements.

Polyester Pipe

Presumably, because of early military application, a large amount of research effort has been expended in the development of improved Fiberglas reinforced polyester pipe. Polyesters, like phenolic and furane resin cement mortars, may be reinforced by a large number of materials and readily converted to solids. Polyester pipe is usually made by wrapping on a mandrel or by centrifugal casting. Progress has also been made in the continuous manufacture of polyester pipe using glass fiber rovings (6).

Reinforced polyesters are resistant to many acids, salts and solvents at temperatures as high as 250 F. This pipe is not recommended for use in the presence of strong alkalies (7, 8) or hydrofluoric acid.

While, as previously stated, the future demand for thermoplastic pipe will far exceed that for thermosetting pipe, nevertheless, a large volume of polyester pipe will be produced. Polyester pipe will undoubtedly become the most important commercial thermosetting pipe.

THERMOPLASTIC PIPE

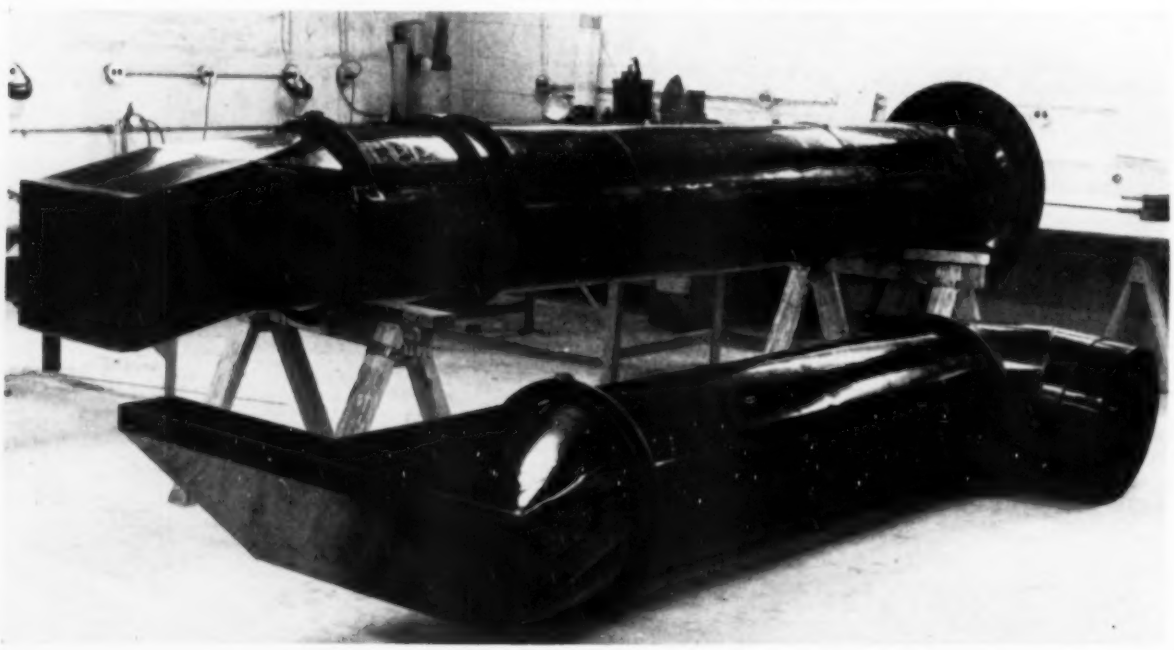
Polyethylene

Polyethylene pipe is available commercially in sizes ranging from ½ in. to 4 in. outside diameter. The unfilled pipe is flexible and the filled polyethylene pipe is semi-rigid. Because of lack of rigidity, the pipe is seldom threaded but is usually joined by stainless steel clamps or serrated fittings molded from high impact styrene. Since polyethylene pipe is available in coils measuring fifty or 100 ft in length, the problem of jointing is less important than with pipe that is available in shorter lengths. Some difficulties have been experienced with welds in polyethylene pipe but for the most part, this type of pipe has proved to be satisfactory when virgin plastic has been used.

Polyethylene, like other materials of construction, is not the final answer to all pipe problems. In addition to difficulties with joints, considerable troubles have been encountered through the use of reprocessed polyethylene pipe and until recently, some manufacturers did not differentiate between virgin and reprocessed material.

Over 33,000 ft of 2 in. polyethylene pipe was laid in acid soil at Ray, West Virginia. While some difficulty has been experienced, it must be emphasized that metal pipe lasted less than three years in this soil. Carns and Flentje (9)

Section of P.V.C. "above-roof" duct and slot section heat-formed and joined by "hot-gas" welding method. It is believed that P.V.C. will be one of the most widely used materials for pipe in the American chemical industry. Check "Polyvinyl Chloride" section of this article for properties and applications.



have advocated restricted use of polyethylene pipe for water lines in outlying districts of over one hundred towns. However, some towns of California have concluded that plastic pipe presently available is not satisfactory for water lines.

In spite of occasional unsatisfactory experience, pipe made from virgin polyethylene can be recommended for many applications where an inexpensive lightweight flexible pipe is required. It is important to note that 13 ft of lightweight polyethylene pipe weighs about the same as one foot of steel pipe of similar size. Polyethylene is resistant to many acids, salts and alkalies (10, 11).

Cellulose Acetobutyrate

Extruded cellulose acetobutyrate pipe has fair chemical resistance to mild corrosives and petroleum. As in the case of polyethylene, it is seldom joined by threading. However, fair success has been attained using the solvent welding technique with slip-on sleeves for joining this type of pipe. Y's and T's and other S.W.P. units must not be disturbed until the cemented section has dried thoroughly. This may require an interval as long as 24 hours. One western utility company has had over 100,000 ft of this pipe in service for transporting gas during an eight year period.

Saran

Because Saran pipe has been used commercially in sizable amounts in this country for over ten years, more is known about its attributes and shortcomings than any other type of plastic pipe. It is available as extruded pipe in 10 and 20 ft lengths in i.p.s. sizes ranging from ½ to 2 in. A wide variety of molded fittings for each of these sizes is also available. Saran pipe is resistant to many acids, salts and solvents at temperatures up to 150 F. but is not recommended for continuous service with strong alkalies for service at higher temperatures or for low temperature service (12). It may be joined by heat welding techniques similar to those used for polyethylene.

For more severe services, such as temperatures as high as 190 F., it is protected by a steel shell. Steel pipe has also been lined with Saran rubber. However, Saran and Saran rubber should not be confused since the chemical and physical properties are not similar.

Various sizes of high-impact styrene copolymer pipe and fittings.

High Impact Styrene

Because of its lack of resistance to impact in spite of its good supply and general resistance, polystyrene has not been widely used for pipe. This deficiency has been overcome to a large extent by blending various copolymers. One of the most widely used high impact styrene compositions consists of a blend of butadiene acrylonitrile rubber (Buna N) and a styrene acrylonitrile copolymer.

High impact styrene pipe is available in 10 and 20 ft lengths in sizes from ½ to 6 in. It may be readily machined and can be bent and formed when heated. It may be solvent welded but cannot be joined by hot gas welding methods. Molded threaded fittings are available in the form of couplings, flanges, reducers, Y's and T's for all sizes up to two inches.

High impact styrene pipe is light in weight and has good resistance to many acids, alkalies, salts and some solvents (13, 14). The friction loss of liquid transported by high impact styrene pipe is very low due to the smoothness of the internal surface and possibly also due to the failure of the liquids to wet the pipe.

At present there is much confusion in published data, particularly insofar as bursting pressures are concerned. Most of the values for bursting pressures are based on theoretical bursting pressures using different factors of safety. Theoretical bursting pressure is equal to two times the tensile strength times the wall thickness divided by the inside diameter. For usable bursting pressure, the theoretical bursting pressure should be divided by five. Since the tensile strength varies with temperature, it is obvious that the bursting pressure at 150 F will be less than that at room temperature.

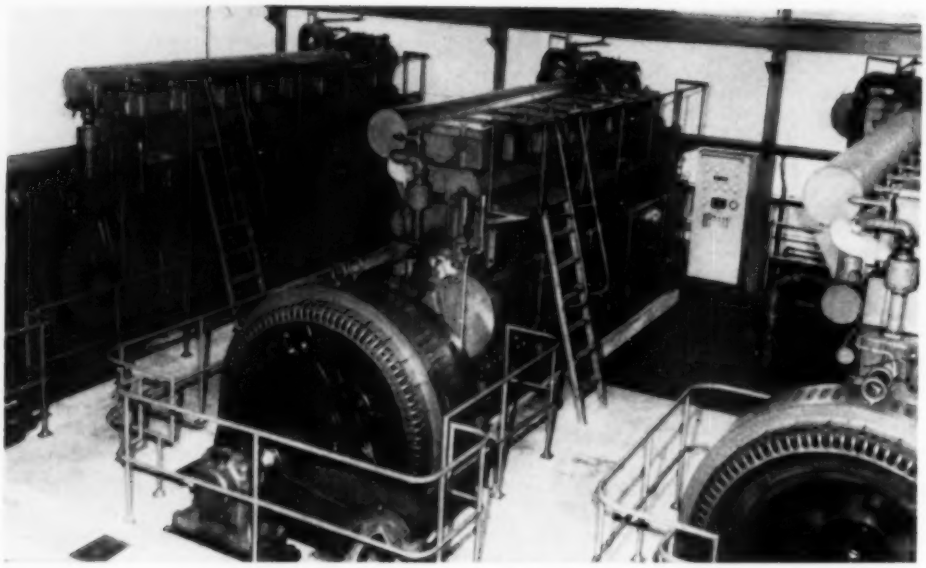
High impact styrene pipe can be threaded readily using hand pipe tools or a pipe threading machine. In either case, the cutting tools must be clean and sharp and have a front rake angle of 5°. When threading high impact styrene pipe, the best results can be obtained by inserting a tapered plug firmly in the end of the pipe being threaded to prevent distorting the pipe wall. It is not necessary to lubricate the pipe when threading and strap wrenches are preferred to pipe wrenches for assembling.

This pipe can be bent by heating to 200 F. and bending around a radial form. Deformation of the pipe during bending can be prevented by filling with sand and bending around a standard form. The pipe must be bent beyond design and allowed to spring back since there is some recovery. Immediately after bending, the pipe should be cooled in water while being held in the final desired position.

It is recommended that overhead lines be supported continuously by an angle iron. If strap hangers are used, they should be placed at intervals of three to four feet. In preparing threaded joints, a compound lubricant prevents chattering and galling and facilitates the making of pipe joints without excessive wrench pressures. Flanged bolts should be tight enough to compress the gasket material slightly and make a good seal but not tight enough to distort the flange.

Because of its ready availability, high impact strength and general overall chemical resistance, the use

(*Continued on page* 104)



Three 1760 hp, 16 x 20 in., 4 - cycle, supercharged Worthington diesels carry the bulk of the load using No. 5 oil as fuel.

Carolina Plant Cuts Fuel Costs by Using No. 5 Oil in Diesels

By R. M. WEATHERLY

Manager, Municipal Light & Power System
Tarboro, North Carolina

Tarboro, North Carolina, operating diesels on No. 5 fuel oil instead of more expensive fuel, has reduced per-kilowatt fuel costs by approximately 34 per cent.

AT THE TIME the latest expansion for the Tarboro, North Carolina municipal plant was being planned, the high cost of light diesel fuel led officials and engineering consultants to select engines capable of burning a cheaper, heavier oil. So, in 1949, an entire new wing was constructed, and three 1760 hp, 16 x 20 in., four cycle, supercharged, Worthington diesels were installed. These three latest units now carry 80 per cent of the total load. The fuel now in use has an API gravity of 15.5, viscosity S.U. 250 at 100 F, sulphur 1.59, and ash .04.

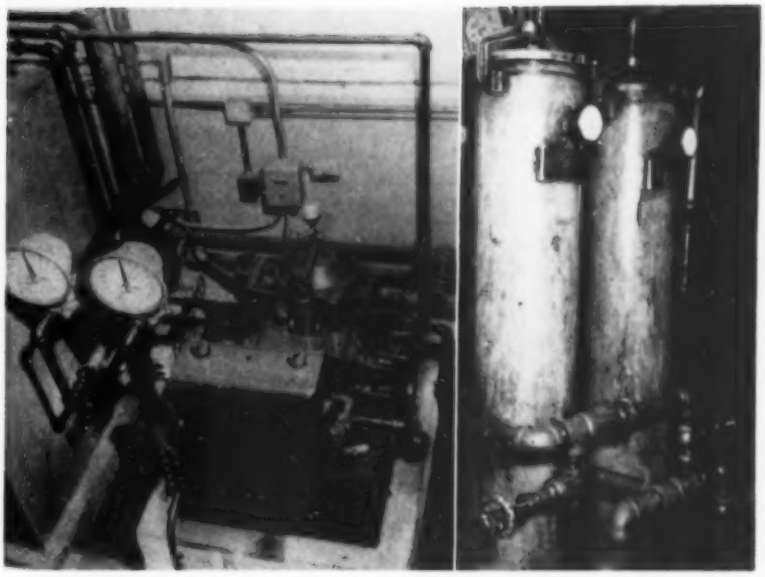
Because the heavy fuels are not sufficiently volatile for use until after the engines have been thoroughly warmed up, a dual fuel system was necessary. The system employed permits use of either of two fuels or combination of the two. Actually, there are two separate systems which merge at the engine selection valves.

At present, the plant uses a No. 2 oil for starting and stopping the Worthington engines and No. 5 fuel oil (without blending) for regular operation.

Engine cooling is of the closed circuit type utilizing, of course, treated water. The cooling water is circulated through engine jackets and shell-and-tube exchangers by motor driven centrifugal pumps. The jacket water is used to provide

Comparative Fuel Costs

		kwh	kwh per gal	mils per kwh
New Engines	Heavy Oil	10,130,000	14.4	5.10
	Light Oil	1,954,800	13.4	8.50
	Total	12,804,800	14.2	5.66
Older Engines	Light Oil	2,520,000	11.4	10.00



The heavy fuel oil is put through a DeLaval centrifuge (left) to remove excessive solids, and is also cleaned in a Hoffman filter (right) with fuller's earth elements.

heat in the outdoor heavy oil storage tank and in the day tank. In addition, the water lines are enclosed in the same insulation jackets as the fuel lines so that, regardless of temperature extremes, pumping viscosities are easily maintained.

Volumetric efficiency of the newer engines is increased by exhaust turbo-chargers which send air into the cylinders at three pound pressure, and the exhaust gases, after passing through the turbine side of the superchargers, discharge to a battery of silencers.

Other Problems

While the heavy oil presents additional problems, over and above light fuel problems, their solution is being achieved. Most problems revolve around the fact that the higher solids content of the heavy fuel imposes additional filtration problems and also places a heavy load on the injector pumps. Cylinder liner wear is also somewhat increased.

Many of these problems have been solved by centrifuging and the use of both edge type and cotton filters on the oil. Centrifuging removes four pounds of solids from each thousand gallons of heavy fuel oil. Chromium plated piston rings, now used in the top two grooves of each piston in one engine show excellent promise of maintaining compression and reducing oil consumption for long periods. Their use may be extended to the other two Worthington engines.

Cost Data

Present fuel savings accrue from two sources: increased output in terms of kilowatt hours per gallon of fuel, and lower cost per gallon. The Worthington units average 14.4 kilowatt hours per gallon on heavy oil. This figure compares favorably with the 13.4 kilowatt hours per gallon obtained by the same units with light oil. Also favoring the use of heavy oil is the 4.1¢ per gallon price differential which prevails.

Specifically, the new engines produced in the fiscal year ended June 30, 1952, a total of 12,084,800 kwh, while consuming 705,039 gallons of heavy oil and 146,247 gallons of light oil. The units generated approximately 84 per cent of their total production on heavy oil, the rest on light. Fuel cost per kwh is 5.1 mils on heavy oil compared with 8.5 mils for the same engines on light oil. Thus, the use of No. 5 fuel results in a saving of 3.4 mils for each kwh produced with the heavy oil, or a saving of $34,000 on fuel for the year.

It is also true that the new engines are the most efficient prime movers in the plant in fuel consumption so that their fuel cost, averaging 5.66 mils for combined light and heavy oil output, is a full 44 per cent under the 10.0 mils for the older units on light oil. At current fuel prices and the production rate of the last fiscal year, this represents a saving on the new engines of more than $52,000 a year on fuel oil, compared with what it would have cost at the old engine rate.

The accompanying table gives some comparative figures on fuel costs and consumption for the past fiscal year.

Principal Equipment—Worthington Units

Engines	Three 1760-hp., 16 x 20-in., 4-cycle diesels operating at 360 r.p.m. Worthington Corp.
Generators	Three 1557 kva., 4160/2400 volt, 3-phase, 60 cycle Westinghouse Electric & Mfg. Co.
Auxiliary lube pumps	Three—Worthington Corp.
Lube oil coolers	Struthers-Wells
Lube oil purifiers	Honan-Crane Corp.
Lube oil	Esso HD. Esso Standard Oil Co.
Heat exchangers	Struthers-Wells
Cooling water pump	Worthington Corp.
Fuel oil centrifuge	DeLaval
Fuel filters	United States Hoffman Co.
Fuel oil purifier	Honan-Crane Corp.
Starting air compressor	Worthington Corp.
Switchboard	Westinghouse Electric & Mfg. Co.

CONCRETE FLOORS

"Absorption Process" Technique

Floor topping provides smooth, hard, and tough surface for constant, heavy-duty usage. Optimum density and minimum initial shrinkage features of process.

This concrete warper room floor in Textron Southern's Hartwell, Georgia, filament rayon weaving plant was finished with Kalman "absorption process" floor topping. The smooth, hard surface will last for years provided the floor is properly maintained—only sweeping and occasional washing are necessary.

THERE ARE essentially two types of concrete floors used in industrial and power plants—*monolithic* and *granolithic*.

The monolithic requires that the floor be constructed as one slab of concrete (no topping involved). Monolithic slabs which are floated and trowled may make good structural concrete, but do not give the type of surface which will resist usage.

An improvement is to add a mixture of trap rock or similar graded aggregate to produce a better wearing surface. Another method is to depress the slab from ¾ to 1 in. and install a separate wearing course using materials and procedures that produce much greater density, toughness and wearing ability.

This last method is what is known as granolithic, and is the type represented by the Kalman Floor Co. "absorption process" floor topping to be described.

It can be applied either on a fresh slab or as one of the last operations after heavy construction is finished. During construction a considerable amount of heavy machinery is often moved over the flooring. If it is moved over the slab, the finished flooring can be put on after the moving has been completed. This is a considerable advantage.

Good granolithic floors usually consist of Portland cement, sand and trap rock. Unsatisfactory granolithic floors can be made of the same materials—the difference is in the method and skill of installation. The Kalman technique enables successful use of a higher proportion of trap rock or coarse aggregate. The trap rock is selected for the shape of the particles and for gradation, as well as for hardness and toughness.

Water Removal

A proper low water-cement ratio produces the maximum strength and toughness in the Portland cement. The "textbook" minimum is 29 per cent by weight or approximately 3 to 3½ gallons of water to one bag of cement. Usually twice as much or more water is used for the average installation. An excessive water content means excessive shrinkage, curling, cracking and pulling away from the slab or fill. It means porosity, lack of toughness—and dusting.

The Kalman method uses up to 5

Material has been adapted from data furnished by the Kalman Floor Co. The company emphasizes that numerous engineering firms in the South and Southwest—Lockwood Green Engineers, Inc., Daniel Construction Co., Robert and Company, and J. E. Sirrine & Company—have included Kalman techniques in many of their specifications.

Specific installations in the South include The Utica-Mohawk Cotton Mills, Mohawk, S. C.; Springs Cotton Mills (Bleachery), Lancaster, S. C., and Rock Hill Printing and Finishing Co., Rock Hill, S. C.

Applicational views of the Kalman "Absorption Process" technique. A grout coat of cement is applied to the underslab (not illustrated). This results in a complete bond between the topping and the slab. Blotting material is applied (above, left) and covered by a layer of dry cement for withdrawing the water to the proper specification. Blotting material is removed at the proper time. Dark areas (right) are sections of the floor in which the water has seeped through to the blotting material.
Machine trowel is applied (below, left) to topping several times after a thorough compacting. Finishing requires hand troweling (right) to provide a smooth, even, dust-free surface.

gallons of water per bag of cement. This is enough for complete hydration. Then, after the topping is poured and leveled, the slightly excessive water is withdrawn to the proper specification by applying a thin layer of dry cement over a burlap base. Withdrawing the excessive water provides a topping of unusual density, hardness, and durability. The water is absorbed without disturbing the aggregates or bringing the fine matter from the bottom to the top. It also produces a definite suction bond to the slab.

Kalman topping has a crushing strength of 8 to 10,000 psi. Monolithic slabs average 2,500 to 3,000 and rarely exceed 3,000 psi.

Colors — Abrasives

You can only use certain colors —non-fading metallic oxides. The proportion generally doesn't exceed 7 per cent of the cement, depending upon the color desired. The four colors that can be used are red, brown, grey, and green—beyond that you're kidding yourself.

The type of abrasives which might be included in the floor depends entirely upon the type of traffic. Emery, aluminum oxide, alundum and carborundum are usu-

(Continued on page 77)

AIR HANDLING EQUIPMENT

More Cubic Feet per Dollar

By **HOWARD C. BURGIN,** Research Engineer, Buffalo Forge Company

Equipment data: high speed and high temperature fans; high pressure blowers; important role of protective coatings and metals in reducing maintenance costs.

AS A RESULT of the increased use of engineering specialists, modern industry is obtaining higher efficiencies from air handling equipment. Economy is being realized through the use of more thorough and detailed engineering with resulting decreased expenditures for equipment and overhead. In the field of air handling, fan equipment manufacturers must give the customer more air for his money.

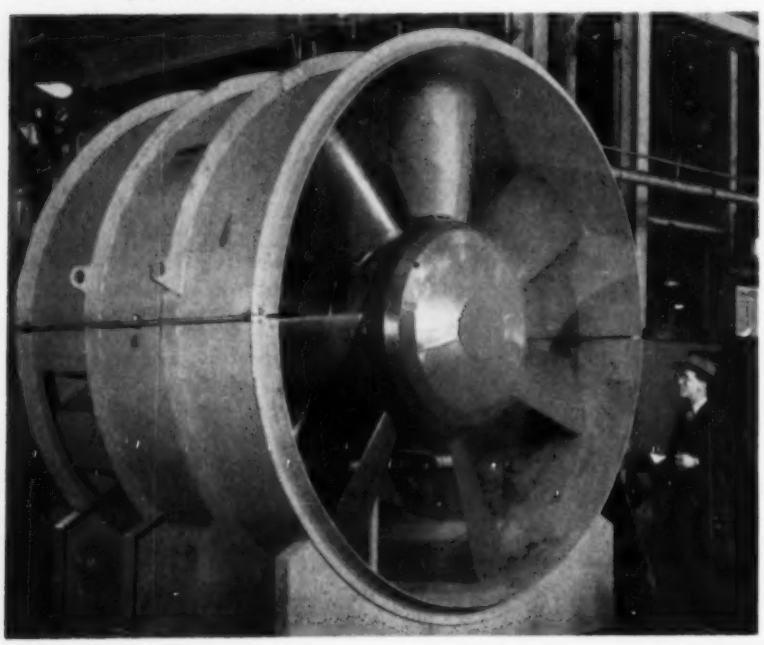
Proper Application

In the not too distant past, the amount of air required and the pressure loss for a certain application was ascertained through rule of thumb, a handy chart or a convenient guide. One of the exceptions was the power industry, where through coal analysis and an orsat of the stack gases, the volume of air needed could be judged quite closely. The usual method ran something like this—

"We had a job like this about 2 years ago and I picked a size so-and-so fan to do the job. I forget what the air was, I'll have to look it up. The job worked okay though."

For most small applications a handbook estimation of the amount of air required was sufficiently accurate. This applied to such uses as conveying wood waste from a saw, exhausting fumes from a hood, ventilating a small room, etc., when it would not pay to make a thorough study. Today most large purchasers cannot afford to adopt this attitude. For one thing buying a fan larger than necessary is wasting money. Yet if an undersized unit is purchased the air requirements can only be met by running at higher speeds, which may mean operating the fan inefficiently. This is a case of penny wise, pound foolish.

120 in. axial flow fan exhausting 325,000 cfm of sulphuric acid fumes from a rayon spinning room. The entire fan is constructed from stainless steel to provide corrosion resistance.



The major items entering into consideration are the price of the equipment, cost of operation, value of the space that it will occupy, operating schedule and longevity required of the unit. For this reason the fan must be tailor-made for the service.

Plant, industrial, production and mechanical engineers are proving their worth through design economy. Not only are the design conditions being accurately estimated but unusual applications are being uncovered by the demands of extremely mechanized industry.

High Speed Fans

For mention here, a high speed

Don't Forget The "Overall" Costs

Fan and associated equipment "overall" costs include the amortized initial investment, repair and part replacement costs, cleaning and maintenance, and operating expense.

Repair and part replacement costs go hand in hand with construction. If the fan is handling abrasive fly ash or corrosive gas, a light duty unit, though cheaper, will not last too long. Housing and wheel construction can be "heavied" up and liners added to glades and scroll; coatings will protect the fan from corrosive gases and extend service life. This should be decided by balancing cost against fan life.

Many industrial plants evaluate power costs and add this to the initial fan cost to obtain an overall picture of their investment. Some other power plants use the capitalized cost of power method, whereby the horsepower is charged at the rate at which it would cost the plant itself to provide extra generating capacity to produce the power. In other industrial plants, the hours per year of operation times the estimated fan life or amortization life is multiplied by the kilowatt hour cost. This is then charged against kilowatt input to the drive.

Because of this power evaluation, industry has become more and more "efficiency conscious." It is realized that the first cost of the unit is sometimes not the important factor. The fan industry has increased its pace in developing higher efficiency equipment. For most industrial applications, a unit can be selected with a total efficiency over 80 per cent.

fan is one that is running at a speed higher than that permitted by standard fan construction. Operating at these speeds has certain advantages.

First it allows the use of an inherently smaller unit. If space is at a premium, this is extremely advantageous. This has been especially true in designing for military use, for many fans were developed for aircraft and ships when the space limits were fixed. An example is an axial flow fan designed and built recently for the U. S. Navy. It was a small, very compact unit that delivered the required air and pressure by operating at 11,500 rpm.

Fans designed for high speed have another advantage. Where noise is a problem the sound is more easily deadened by the use of sound traps because of the higher frequencies.

The use of high speeds imposes certain construction problems. Wheels with backward-inclined blades tend to fail unless strengthened by using heavy gauge metals, often of high strength alloys, and by employing intermediate stiffening rings. For very high speeds radial blades must be used in combination with heavy shroud rings or flanges constructed from high strength alloys. Besides bending and shear stress, vibratory stresses must be avoided.

The only sure way to determine wheel strength is by spinning it at increasing speeds until it fails. This is accomplished by running the wheel or rotor in a vacuum pit. Under nearly perfect vacuum conditions full size wheels can be rotated at very high speeds, using small turbines, where otherwise they would require thousands of horsepower. By watching and noting the section of the wheel that failed and by deliberately weakening various parts of the wheel to induce them to fail, valuable information can be obtained that may alter the design and produce a stronger rotor.

Another method of testing is by placing strain gauges on various parts of the wheel. By loading and artificially causing the wheel to vibrate, stresses and vibration frequency can be measured. In this manner the causes of failure can be determined and eliminated.

The design of the wheel is not the only problem, although it usually is a major one. Other factors to be considered are the shaft and bearings. Since the shaft is operating at a high speed, it means a still higher critical speed, obtained only through a low shaft deflection. The difficulty here is that everything is cumulative. The thicknesses of the component parts of the wheel have been increased, which makes the wheel heavier to start with. With the standard shaft this increases the deflection and lowers the critical speed. In order to meet the high critical speed desired, the shaft size must be greatly increased. For a double fan with the wheel suspended between bearings the shaft size may get large enough that the shaft weight itself is a very important consideration. With the large shafts and fast rotation, surface speeds through the bearings become high. If sleeve bearings are used, water cooling is required. Another factor is thrust, which is a result of the pressures produced by the high speeds.

Larger Fan Equipment

There is a definite trend among fan manufacturers for a greater portion of their production to go into large size fans. American industry has expanded tremendously in the past few years with much of it being the construction of large new plants. This has been accompanied by an unprecedented demand for large air supplies, sometimes at relatively high pressures. At the same time industry is definitely interested in costs—initial costs, operating costs, repair and depreciation costs.

These factors are answered by large fans for the following reasons: The initial cost for one large unit is less than for two smaller units. Added to this is the savings in drives, motors and couplings. There is also a saving in duct work leading to and from the unit and perhaps in either inlet and outlet dampers. One of the important considerations is space. Very often where fans and ductwork must be installed in existing cramped quarters a minimum of fans is a necessity.

An example is the air conditioning of already-built structures. Very often large axial flow fans are selected. They provide a compact, in-line installation with a maximum capacity in a minimum of space. These fans are used widely for ventilating mines and tunnels, motor cooling, and general ventilation

work. The larger unit will operate with a slightly higher efficiency than several smaller units because of the decrease in losses through a larger fan,—skin friction in the housing, friction through the wheel, inlet obstructions if bearings are so placed and a slight gain in motor efficiency. It also very often happens that in fan selection a larger fan can be picked from a more efficient section of the performance curve. The large unit has these advantages: smaller initial cost than several smaller units, smaller space requirements, frequent decrease in duct costs, and higher operating efficiencies.

However, multiple smaller units cannot be disregarded. For wide fluctuations in air requirements as where the need is seasonal, one or more units can be shut off completely, which is better than dampering down a larger unit. Several units can also cut down installation costs by enabling the fans to be placed close to where the air is to be delivered.

All these factors must be taken into consideration in selecting a unit or units for your plant. Since the saving in dollars can be considerable, it is economically desirable that a thorough study of the plant application be made.

Plant Service Note.

Don't forget that your fan manufacturer or sales representative can help you in figuring the job conditions, give advice as to fan type, size and selection, and answer many of the questions that come up about air flow.

The fan representative can give helpful information about installation, maintenance, inspection, cleaning and lubrication that will help you secure the greatest possible life from the unit.

High Temperature Fans

Many new processes and developments demand the handling of air or gases at high temperatures, although for other uses the gas can be diluted to reduce the temperature. Keeping cost again in mind there is a definite saving if it can be handled undiluted. Since 900 F is the oxidizing temperature of ordinary steel, anything above is generally considered as high temperature. Fans have been constructed for temperatures up to 1700 F.

You can readily understand the problems posed to the fan manufacturer. The housing is constructed of all welded special alloy steel and for very high temperatures it must be cast of special alloys. It must be supported from the centerline so that the housing will expand in both directions so shaft and bearing alignment may be maintained. The bracing is heavy and tied in rigidly with the center-support, which is also true of the bearing base that has a machined bearing surface to maintain correct alignment. Clips are welded on the housing so that insulation can be applied to keep the ambient room temperature low. To keep the hot gas from escaping along the shaft, seals must be used. For the lower temperatures, water cooled stuffing boxes are used which keep the leakage down to a minimum. For higher temperatures or high rubbing speeds, carbon ring seals must be used.

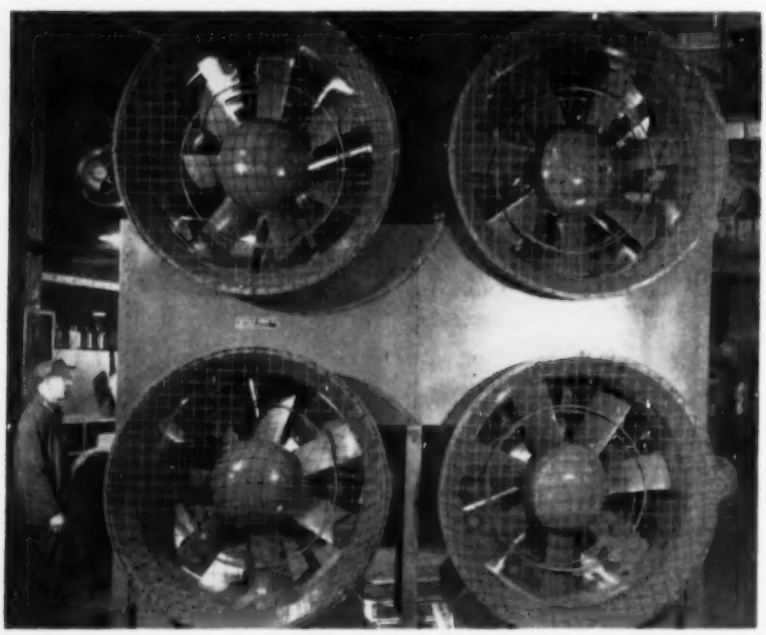
Extreme care must be used in the assembly of shaft, bearings and seals, since the clearances of the seal are very small. Shaft deflection plus any small misalignment due to expansion could cause rubbing on the seals on one side and leakage on the other. A heat slinger is also used on the shaft between bearings and housing. This is a small centrifugal wheel that disperses some of the heat that travels along the shaft, before it reaches the bearings. With the stuffing box and heat slinger separating the fan housing and bearings, the overhang of the wheel is increased. To keep the shaft critical above the running speed means a larger shaft diameter which often pushes the rubbing speed of the bearings higher than is desirable, although with the modern sleeve bearings, rubbing speeds have been increased.

The type of bearing to use has to be determined by the application. The factors of temperature, thrust, rubbing speed and loading enter into whether the bearing should be ball, roller or sleeve and whether it necessitates forced feed oil lubrication and/or water cooling. Fan shafts for high temperatures have been and still can be water cooled; however for most temperatures the high chromium, nickel alloys are suitable.

The most critical part of the fan is the rotor itself. Because of the rotative stresses, construction is always special. For most high speed, high temperature ratings radial blades are used, for then the centrifugal blade stress is negligible and any steel with oxidizing temperature high enough is suitable.

The greatest stress problem is in

Four axial flow fans designed to deliver 200,000 cfm in parallel operation. Any or all of the fans can be operated, allowing a wide fluctuation in volume.



the flange, since it is loaded by the blade force as well as its own. To withstand the stress at the elevated temperatures, the flanges are fabricated from high chrome-nickel sheets, sometimes in lamination at the inlet, if the stresses are very high. The backplates are made from the same material and the hubs cast from a similar type of alloy as the shaft, not only to withstand the temperature but also to have the same rate of expansion. The wheel is all-welded into a solid, heat withstanding unit.

High Pressure Blowers

High pressure blowers are ideally applied to handle relatively small volumes at high pressures. Some of their uses are for fuel atomizing, primary air, scavenging of gasoline or diesel engines, pneumatic conveying, furnace blowing and chemical processing. They have been built for pressures of 5½ psi in one stage and can be assembled in a multi-stage unit for higher pressures.

The units are small and compact and the continuous flow assures a uniform delivery of air or gas without receivers. Another feature is that at no time can pressure build up beyond the maximum pressure for which the unit is designed.

From an economic standpoint there are other advantages of the high pressure blowers. They are relatively cheap due to their compact design. The large internal clearances mean a minimum of wear which keeps repair and replacement costs down. The high pressure blower operates at low cost as a result of high efficiencies. The above illustrates how, by analysis of the volume and pressure requirements and their limits, a high pressure blower may be selected that will provide low initial cost, low maintenance and low operating costs.

Coatings and Special Metals

One of the last thought-of factors that enter into overall fan expense, is the cost of maintenance, repair and replacements. Protective coatings and special metals play an important part in reducing these costs. Because a fan continues to perform it is often forgotten until there is a major breakdown. A fan should be inspected regularly, the frequency depending on what type of air, gas or material it is handling. If the air is dirty the rotor should be cleaned before it causes unbalance with consequent damage to bearings. If the gas is corrosive and is attacking the rotor and housing; inspection catches it, and preventive maintenance can retard this corrosion.

To retard corrosion and wear the fan can be constructed from special metals such as the chrome nickel alloys and various types of stainless. The purchaser should specify the particular metal that would best resist his particular gas.

Protective coatings can be broken down into several types. The regular factory paints and enamels do a good job for stopping oxidation and weathering. The plastic base paints perform still better, protecting against salt air and slightly corrosive fumes. The plastic and synthetic coatings applied in five to seven coats, thoroughly air dried or baked between layers, give the maximum protection for this type of coatings. Lead coatings for fans are particularly useful in resisting certain types of acid fumes such as sulphuric, sulphurous or chromic acids.

For maximum resistance against acid fumes, the rotor and inside of fan housing can be rubber-covered. Either soft, medium or firm grade rubber can be bonded to the metal with an adhesive strength of 700 psi. Pure live rubber so bonded is capable of withstanding the high stresses set up in the fan and yet flexible enough to resist cracking and exposing the metal. Rubber covered fans prove exceptionally durable and are used throughout the entire chemical industry and in numerous experimental laboratories.

The factors that enter into the choice of coating are the concentration of the gas, frequency of fan operation and the inherent corrosive qualities of the coating material. By thorough analysis it is possible to spend pennies and save dollars by prolonging fan life.

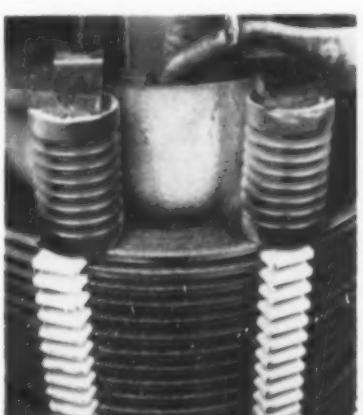
Sealed Dry-Type Transformer Overloaded to Point of Failure. What Happened?

When a sealed dry-type transformer was recently overloaded to the point of failure, it simply dropped its load. No fire—no explosion. Class H sealed dry-type transformers were introduced by Westinghouse in 1942. Designed for installation close to the load, they do not require fireproof vaults. They use only a small amount of volatile material, and operate in pressure-tight cases under a small pressure of dry nitrogen.

A standard core and coil assembly was placed in a tank equipped with thermocouples, thermometer, and a pressure gauge. A spark gap was located above the core and coils in the region where insulation decomposition gases would accumulate. The transformer was sealed in its case under a one pound pressure of dry nitrogen.

The transformer was excited at normal voltage and a standard temperature test begun. The unit carried 100, 200, 300, 400, and 500 per cent of rated load for one hour each, with no cooling period between loads. The gap was flashed over every 50 seconds.

After carrying 600 per cent load for ten minutes, the transformer dropped its load, as indicated by the load ammeter. There was no disturbance. Subsequent examination revealed that the failure resulted from the melting out of a part of the low voltage winding near the top of the coil. It is not certain whether a turn-to-turn fault occurred first, or whether the copper reached its melting point.



Note excellent condition of the high-voltage coil after being heated to an average temperature of 640 degrees C.

INDUSTRIAL ENGINEERS

What Do They Do For Industry?

By R. N. LEHRER, F. F. GROSECLOSE, and J. M. GALEY
School of Industrial Engineering, Georgia Institute of Technology, Atlanta, Georgia

SOUTHERN industry has done an enviable job of increasing employee income, lowering costs, and increasing productivity in the past several years. The Industrial Engineer has played an important part in these accomplishments, and won praise from business and industry. The demand for Industrial Engineering graduates is ever increasing as more executives and managers become aware of the nature of industrial engineering activity.

The main objective of industrial engineering is the coordination of men, materials, and machines in order to achieve optimum benefit to the employees, management, and owners, the consumer, and society.

The concepts of industrial engineering have developed from the 'Scientific Management" movement. The early works were motivated by a desire to apply engineering principles and a systematic approach to the everyday problems of shop and business operation. Typical of such activity was the development of work assignments in terms of human capabilities, making work easier and quicker, establishing cost control procedures, coordinating material flow and work schedules, and many other things that are quite common these days.

Since the early days of scientific management, Industrial Engineering has developed into a large and important field. The Dictionary of Occupational Titles describes Industrial Engineering as follows:

"The Industrial Engineer deals primarily with production in a manufacturing establishment. He is concerned with methods, organization, planning, controls, coordination, equipment, and personnel—all of the factors which play a role in the cost, quality, and quantity of output. He deals with top management, the engineering staff, and the production force in achieving these goals.

"Industrial Engineering is a loosely defined occupational area, usually included in the broader field of Management Engineering. In its restricted usage it is limited to production organization, planning, and methods. It may include the training and direction of personnel, specifications and purchasing of materials, cost and sales control, health, and safety programs, accounting systems and traffic management. In some instances, this occupation embraces the management of construction of new industrial enterprises and large scale public works. It may also include consultation in the area of finance and economics as related to mergers, reorganization, large-scale modernization, retooling, etc."

At Georgia Tech we feel that industrial engineering is all of the above, based on four important phases of training:

1. A broad engineering background, including basic science and applied engineering.
2. Training in the principles and techniques of management.
3. Training in the principles and

THE AUTHORS

Col. F. F. Groseclose

Dr. Robert N. Lehrer

Col. Frank F. Groseclose, Director of the School of Industrial Engineering, Georgia Tech, is currently on leave and serving as Head of the Equipment Research Department, U.S. Navy, Port Huenume, California. In April he was nominated for the position of National President of the American Institute of Industrial Engineers.

Dr. Robert N. Lehrer is Associate Professor of Industrial Engineering, Georgia Tech. He is also Acting Vice-President, Southeastern Region, American Institute of Industrial Engineers, Inc.

James M. Galey, formerly Instructor of Industrial Engineering, Georgia Tech, is now with the Ethyl Corporation, Baton Rouge, La.

James M. Galey

techniques of production, and

4. Training in the relationships of man and his work, and man, industry and society.

In order to learn more about "What Industrial Engineers Do," we recently surveyed our graduates concerning their work activities. Replies from 300 of these industrial engineering graduates indicate that the "typical" industrial engineer would spend a year's time (based on 251 working days) in the following way:

methods and standards	40 days
materials handling	28 days
wage incentives and job evaluation	23 days
production engineering	23 days
sales engineering	20 days
production control	17 days
production management	17 days
industrial relations	12 days
materials control	11 days
quality control	10 days
product design	7 days
research	5 days
miscellaneous	39 days

It would appear that the most common areas of industrial engineering activity at the present time are methods and standards work, material handling analysis, wage incentive and job evaluation applications, production engineering, and sales engineering. Statistical quality control will likely take more and more of the Industrial Engineer's time in the future, and many engineers will work into supervisory positions.

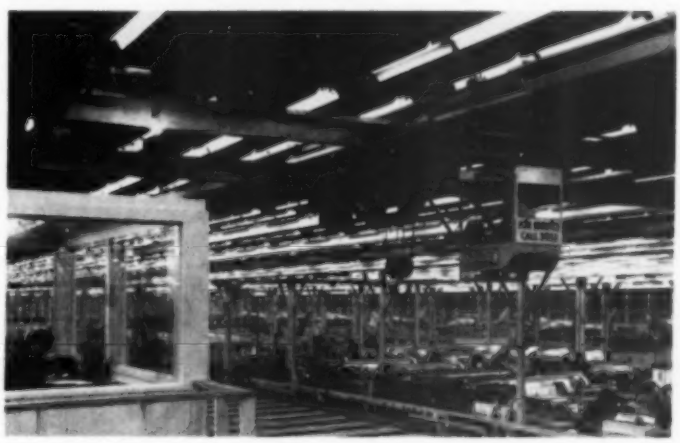
The results of our survey indicate that the young industrial engineer is most likely to be engaged in methods and standards work. Industry depends more and more on well qualified personnel to improve their production and operating methods, and to establish work loads for scheduling and assigning work. This activity always has been an important part of industrial engineering work, and will continue to be so.

Materials handling usually accounts for the largest portion of non-productive industrial activity, and as such receives much attention from the industrial engineer. Special analysis techniques are utilized to minimize the cost of moving and handling materials. This type of activity seems to be of great importance according to the results of our survey.

Industry recognizes the importance of maintaining a fair and equitable wage structure. This type of activity requires 23 days by our "typical" industrial engineer as indicated by the wage incentive and job evaluation category. Production engineering is indicated as of about the same importance. It is important that the technical aspects of production are continually improved, and the industrial engineer is well qualified for this work.

How About the Future?

Due to the broad educational background and the varied tasks to which the industrial engineer is assigned, the future indicates that industry will continue to take advantage of the technical services of our "typical" industrial engineer. Business and industry will utilize his experience for the execution of supervisory and executive duties. The industrial engineer will help with industrial relations work by preventing undesirable situations. He will also guide the installation of many statistical quality control systems. In summary, industry will continue to reduce costs and make their operations more beneficial to all with the help of the industrial engineer.



Two-Way Radio Speeds Overhead Crane Dispatching at Lockheed—Georgia

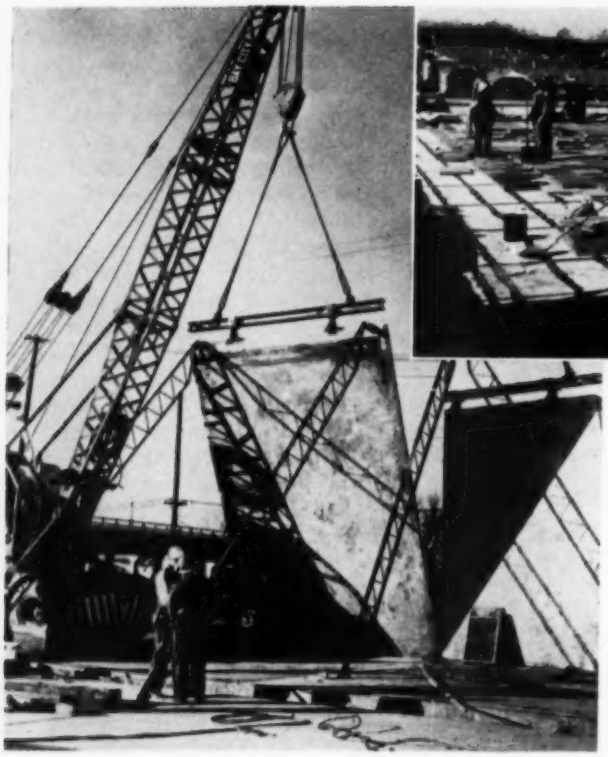
A two-way radio to speed dispatching of overhead cranes in the main assembly building of the Georgia Division of Lockheed Aircraft Corporation has been placed in operation.

A total of 24 crane cabs, which lug anything from 12-ton B-47 Stratojet wings to machine tools across the ceiling of the massive plant, are equipped with the two-way radio. A central dispatching office in the B-1 building will receive phone calls from departments over the plant which have tools, material, or B-47 assemblies that need to be moved to another location. The transportation dispatcher radios the crane nearest the department to roll over and give the object a lift.

The radio-equipped cranes will operate in all seven of the approximately 2000-foot long bays of the B-1 building. Six of the bays can accommodate eight crane cabs at one time. Sixteen crane cabs can operate in the final assembly bay if it should be necessary.

Among other new additions to the transportation communications system are two truck cranes, four yard cranes, 10 fork lifts, 10 tractors, and three trucks. The transportation department has found the two-way radio control makes for more effective use of the equipment.

The transportation radio system is part of the overall Georgia Division industrial radio network which already includes nine radio equipped units in the fire department and plant protection patrol cars, and four walkie-talkies.



One hundred seven concrete and steel panels like those shown at left form the walls of the new $2,000,000 cold storage warehouse constructed by the Mid-South Refrigerated Warehouse Company at Memphis, Tenn. Each panel, pre-cast on the 2½ acre warehouse floor, measures 25 x 27 ft, and weighs 19 tons. The building is enclosed entirely with Fiberglas insulation.

Unlike many forms of glass, the Fiberglas insulation installed on the roof is an effective barrier to sun rays and heat. Consequently the insulation, made of fibrous glass bonded with resin into rigid boards, will help maintain a temperature of minus 20 F in the new warehouse freezers. Walls and floor of the 250 x 407 ft building have 8 in. of insulation. Southern Builders, Inc., Memphis, was general contractor for the warehouse.

Cold Storage Warehouse—Memphis

Pre-Cast Concrete Panel Construction

ONE of the largest cold storage warehouses in the nation is located at Memphis, Tennessee and was opened in May by the new Mid-South Refrigerated Warehouse Company.

The 250 x 407 ft building has 1,300,000 cu ft of all-freezer cold storage capacity, with equipment sufficient for quick-freezing simultaneously 1,000,000 pounds of foods, such as fruits, juices, berries, vegetables, meats, eggs and seafoods.

Modern in every respect, the new $2,000,000 warehouse was started after officials of the Mid-South firm had visited over 30 other refrigeration plants throughout the nation and Hawaii. Ground was broken in August, 1952.

The single floor concrete and steel building includes 5 large freezers (50 x 200 ft) and 4 smaller freezers (50 x 50 ft), 900 lineal feet of enclosed loading docks for trucks and railroad cars, 1,600,000 board feet of Fiberglas low temperature insulation, an intercommunications system, complete mechanized materials handling equipment, York refrigeration equipment, a Niagara Blower System in the freezers with no-frost equipment, and a complete sprinkler system.

The entire refrigerated portion of the building is enclosed in Fiberglas (Owens-Corning) cold storage insulation. Walls and floor have 8 in. of insulation, and the roof has 10 in.

Angier brownskin paper was adhered to the cold inside of the concrete sidewalls as a vapor barrier and dry installation of the insulation was made. The 2 x 4 ft insulating boards were installed in 3 layers with the cold or freezer side

(*Continued on page* 71)

The building was designed by *A. Epstein & Sons, Inc.* of Chicago, and *E. L. Harrison*, of Memphis, was associate. The general contractor was *Southern Builders, Inc.*, Memphis. The Fiberglas insulation contractor was the *M. H. Ellis Company*, Memphis.

While the *Mid-South Refrigerated Warehouse Company* is a new concern, its officials are by no means new in the cold storage business. Practically all of them are associated with the Memphis Cold Storage Warehouse Company, the oldest refrigerated warehouse in Memphis. *William W. Goodman* is president of both companies, and *T. E. McCrary* is vice-president and general manager for the two firms. Other officers of Mid-South are *Charles F. Goodman*, vice-president, *Abe Goodman, Jr.*, treasurer, and *Herbert Glazer*, secretary.

HIGH PRESSURE OXYGEN EQUIPMENT

Grace Company Ammonia Plant—Memphis

THE WORLD'S largest high-pressure liquid-oxygen generator is being built by Air Products, Inc. for the $19,000,000 ammonia and urea-fertilizer plant Grace Chemical Company is erecting in Woodstock, near Memphis, Tenn. The generator will produce more than 200 tons of oxygen and 300 tons of nitrogen daily. It alone is to cost about $1,000,000.

The high-pressure oxygen equipment—only the second of its kind—will permit Grace Chemical, a subsidiary of W. R. Grace & Co., to produce ammonia by a new, low-cost process of partial oxidation of natural gas. A smaller unit of the same type has already been shipped to a Spencer Chemical Company plant now under construction at Vicksburg, Mississippi.

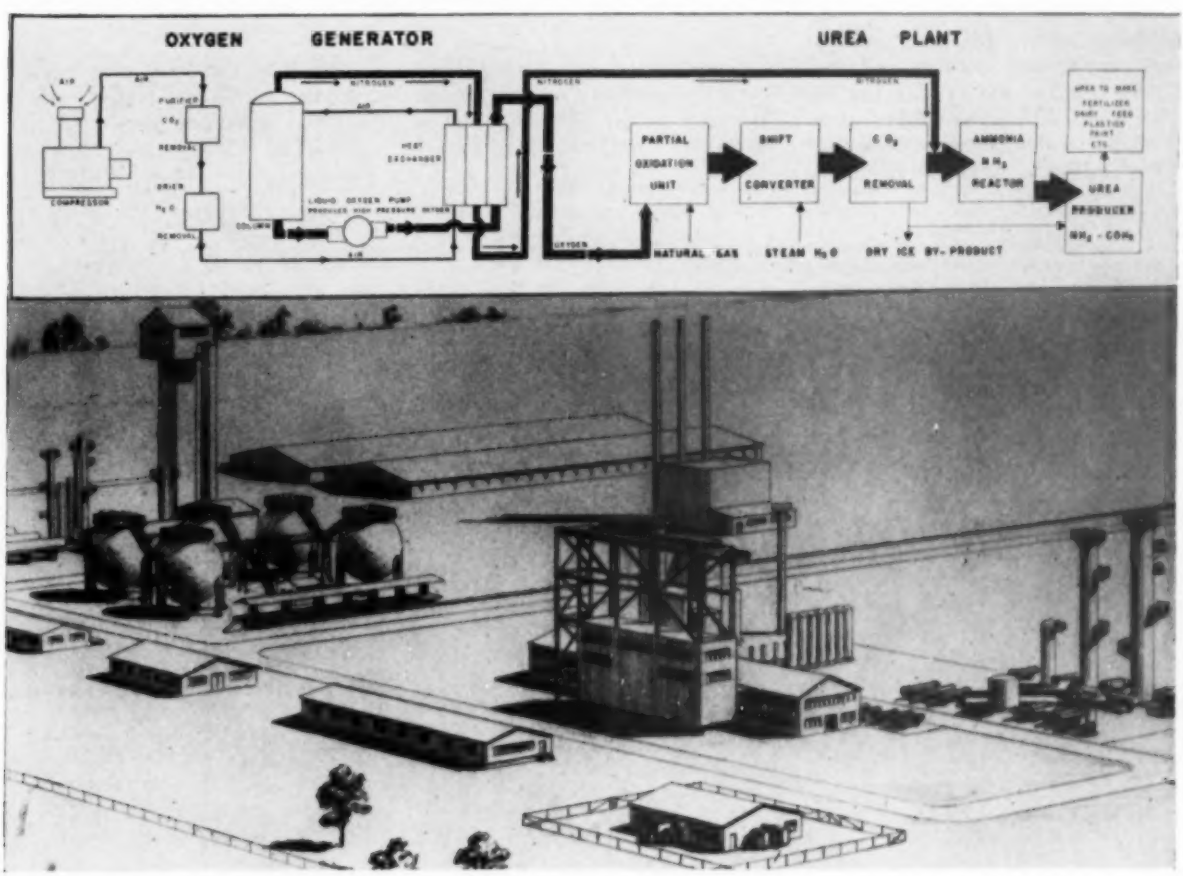
This process, licensed by The Texaco Development Corporation, is expected to greatly improve procedure for the manufacture of petrochemical synthetics, such as plastics and man-made fibers, cutting costs and promoting synthesis of entirely new products.

Contracts for the giant oxygen generator were signed by Air Products with the Foster Wheeler Corporation, which will erect the ammonia-making section of the Grace plant.

The Grace plant will produce ammonia for eventual use in the man-

(*Continued on page* 73)

The Memphis plant of Grace Chemical Company, to be completed in 1954, will use new methods to produce ammonia and urea for use in fertilizers, explosives, plastics, and rocket fuels. The oxygen generator, to be located in the center group of buildings, will supply more than 200 tons of high-pressure oxygen a day, permitting low-cost partial oxidation of methane (natural gas) to synthesis gas. Grace will use the synthesis gas (carbon monoxide and hydrogen) in the production of ammonia. A portion of the ammonia output will be converted to urea in the tower at left.



Better production brief from
Line Material Company's Southern Plant—

3 timers . . 52 limit switches . . 25 motors in

AUTOMATIC Heat Treating Unit

IN ADDITION to producing an extensive amount of pole line hardware and other metal products, Line Material Company's Southern Plant at Birmingham, Alabama, is now manufacturing 0.30 cal. M-1 Garand rifle barrels. Metalworking operations of this nature call for precision tooling, experienced machine operators, and methods and equipment capable of producing a product to meet exacting specifications.

One production problem was the selection of suitable heat treating equipment and methods to heat treat, quench, and temper the 24 in., 5 lb, WD-4150 modified steel forging blanks purchased from Republic Steel Corporation. The process engineer's most important problems were to produce uniform physical properties and not to create unnecessary straightening operations after heat treatment.

Equipment Selected

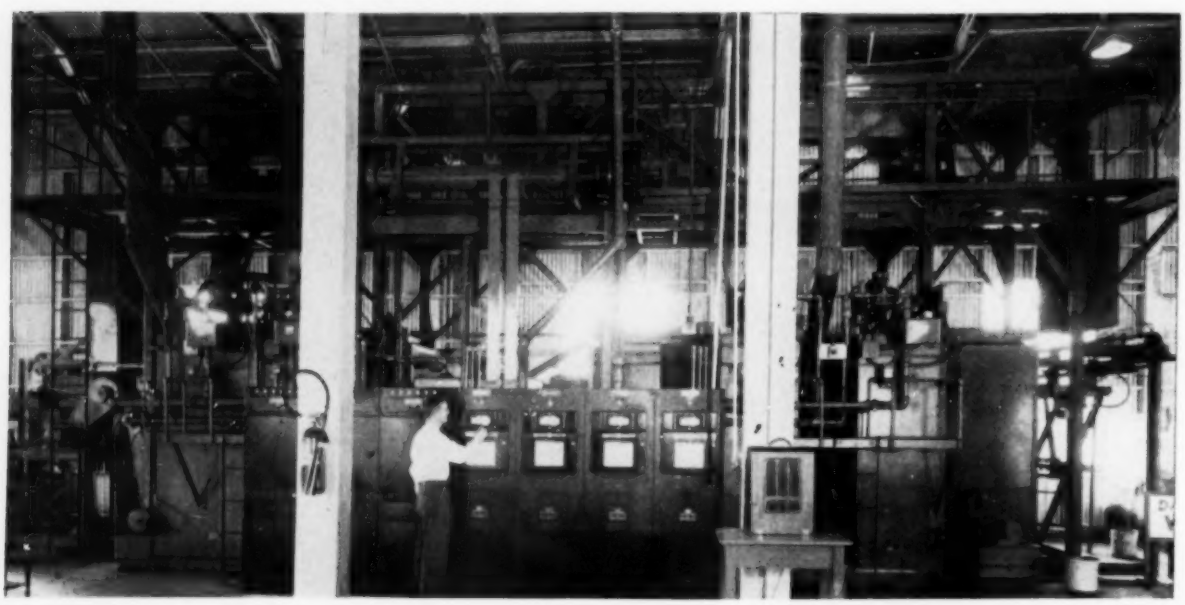
Line Material Company installed a semi-automatic, conveyorized, vertical rifle barrel heat treating unit consisting of a loading station, hardening, quenching, tempering and unloading sections, operated by automatic time cycle controls. The installation is one of six in the country constructed by the Lindberg Engineering Company, manufacturers of an extensive line of industrial heat treating furnaces.

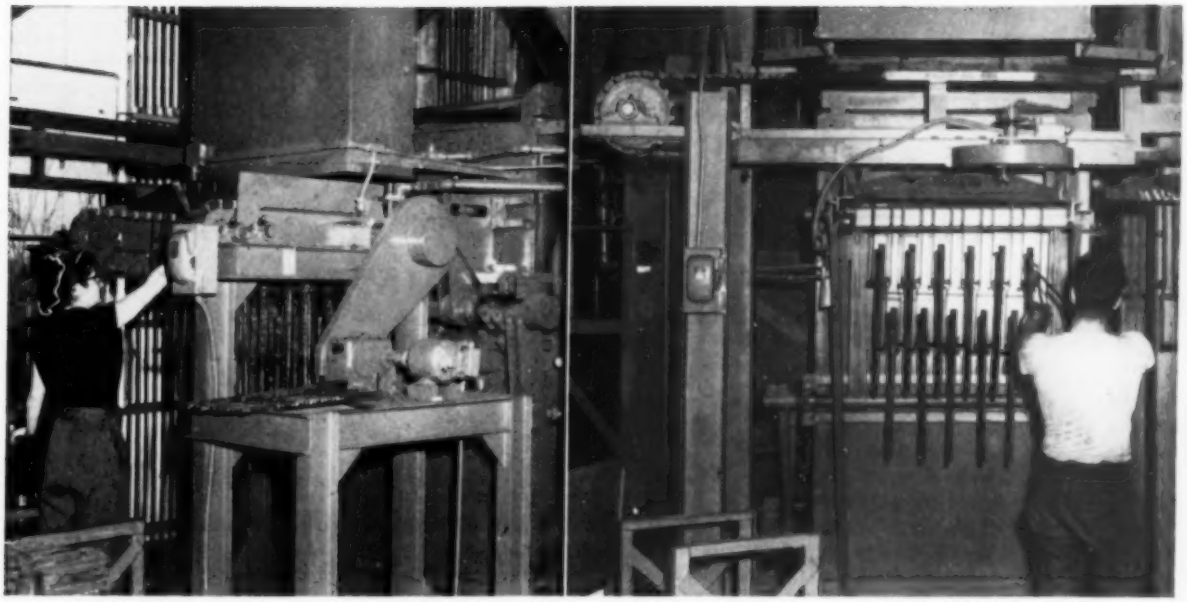
The special type furnace, with a processing time cycle of 4 hours and 20 minutes, has a capacity of 165 rifle barrels an hour, 3,960 a day, and 87,000 per month. Line Material Company's Birmingham plant reports very uniform physical properties, minimum straightening operations, and an economical operation—two men per shift. Complex unit has three timing devices, 52 limit switches, 25 motors from ½ to 7½ hp, and over three miles of wiring.

Operation

The 5 lb steel forging blanks arrive in carload lots. At the loading station, individual blanks are inserted in washers and hung on hangers, each hanger holding 11

Semi-automatic, conveyorized, vertical 0.30 cal. M-1 Ga:and rifle barrel heat treating unit at Line Material Company's Southern Plant in Birmingham, Alabama.





Loading and discharge ends of the Lindberg Engineering Company heat treating unit. Furnace, with processing time cycle of 4 hours and 20 minutes, has a capacity of 165 steel forging blanks an hour.

blanks. An endless conveyor is used in loading to bring the rack to the pick-up point where it is lifted by the tongs, carried across to the loading end of the hardening furnace and lowered on skid rails inside the furnace.

In a four hour, 20 minute cycle, the rack is then pushed intermittently through the furnace by mechanical means. It is raised and lowered into the quench tank and again into the charging end of the tempering furnace. After the tempering cycle, tongs lower and remove the rack and place it on the unloading stand where the barrels are removed and the empty rack returns on the return conveyor to the charging end.

The entire operation is quite similar to that employed in conventional automatized cleaning and plating operations. Each processing step is controlled by an interrelated arrangement of timers and limit switches.

After removal from the hangers, the 5 lb forging blanks are cleaned on a Wheelabrator, Magnafluxed, Brinneled, straightened, stress relieved, and moved by fork truck to Line Material's barrel division fabricating line.

Line Material Brief

Line Material Company is a division of McGraw Electric Company. Southern and Southwestern manufacturing operations include a plant at N. Kansas City, Mo., a fibre conduit and pipe manufacturing plant at Sherman, Texas, and the *Southern Plant* at Birmingham, Alabama. Latter has been operated in Birmingham since 1929 and in their present modern plant for the past four years.

M. L. Ruggieri is plant manager of the Southern Plant; *T. A. Rivenbark*, factory manager; and *Ed Collins*, superintendent of the barrel division. *George Harris* is heat treat foreman. Installation of the semi-automatic heat treating equipment was supervised by Line Material Company engineers and *Lindberg Engineering Company*, representatives of Chicago and Atlanta, Ga.

Pre-Cast Concrete Panel Construction Used in $2 Million Memphis Warehouse

(*Starts on page* 68)

covered with perforated Masonite panels held in place by Wolmanized treated wood studding.

Precaution was taken against frost-heave by installing 8 in. tile on 8 ft centers enclosed in gravel and running crosswise with the building, under the floor. Hot air may be forced from the engine room through the tile. Thermocouples are located underneath the floor and connected with a precision indicator in the engine room to show temperatures under the freezer floors, and thus determine when to start the hot air flow through the subfloor tile system.

Tilt-up or pre-cast wall construction was used with concrete panels 25 x 27 ft, each weighing 19 tons, poured on the 2½ acre concrete slab floor. The panels, probably the largest yet designed for such construction, were lifted into place by cranes. The roof also is made of prefabricated concrete slabs, supported by steel columns, girders and bar joists. The roof is covered with white marble chips to deflect sun rays and reduce refrigeration needs.

The 5 large freezers are designed for minus 20 F and the 4 smaller freezers are designed for minus 10 F. The freezing tunnels are especially adapted for the quick-freezing of fruits, berries and vegetables grown in the nearby farming section. The company also has plans for locating processing plants on its property, and quick-freezing facilities will be afforded the operators of these plants.

The English language isn't sufficient—

Oh . . . that CATALOG Psychosis!

By DON V. PURINGTON, an engineer confused daily by free-wheeling imagination.

Oh . . . those catalogs! How can we find thee and keep thee? How can we consciously keep thee up-to-date? How can we understand thee?

THREE WALLS of our working space are lined with shelves and filing cabinets filled with catalogs, and we have allergies and psycho-neuroses, which have come, according to clinical analyses, from these same three walls of catalogs.

Our normal day is filled with seeking answers to questions about anything, from stove bolts to drop-hammers, from paint to plaster. Between the questions we try to produce intelligent specifications which may cover anything from crack-proof concrete to cold cathode lighting. More often than not, we are called upon to specify a product or a process that is just a mote in some owner's eye and which will be changed by the time the first reproduction has come back across our desk.

We realize, of course, that we are regarded by some of our professional associates and most contractors as the lowest form of animal. Our works, which we may consider masterpieces, are often regarded as evil, technically necessary, but practically unnecessary—and quite suited for File 13 at the job field office.

Ulterior Motives?

It is unfortunate that the ordinary English language will not suffice for the technicians and technologists, and for the advertising copy-writers, whose fine hands are obvious in so much of the catalog literature that surrounds us. It is hard enough to interpret "cold-rolled, pickled, patent-leveled" to an average secretary, without having to take on words like "Bataseal," "Ultrahamotier," "Despicabelator," or some other brainstorm combinations which show up in the trade literature that flows across our desk like a waterfall. We "roll" dice, dough and, sometimes, unsuspecting people. Vegetables, fruit, and even engineers get "pickled" and it is not too difficult to explain a "patent," but what kind of animal is a "Bataseal"? What, in the ultra, is an "Ultrahamotier"? And what evil thing is a "Despicabelator"?

Sometimes, we wonder why we are not psychopathic, instead of just neurotic! One could suspect ulterior motives from the professional men designed to protect their profession from the common herd, but since so many of these professional men detest specification writing so profoundly, it would seem to absolve them of creating these intentional, sonorous sophisms. We all know what happens when a poor contractor and a simple engineer or architect get all tangled up in the words of a specification. It is one of the things that lawyers thrive on.

Being an engineer, we could, with full impunity, accuse the lawyers of creating the word psychosis that seems to afflict some members of our profession. The fear of legal imbroglios has wasted tons of ink and reams of paper, when our compatriots struggle to translate their projects into contract specifications which will be complete and all inclusive. Some of the tomes presented as job specifications lead to the assumption that the authors must measure the completeness of their work by the number of words they have used.

We turn, daily, through pages of catalogs, brochures, pamphlets, data books, or what have you, in research for a particular product and, when we cannot find it, we come up with a problem in etiquette. When we approach an unfamiliar manufacturer with a request for information about his product, what should we ask for? A catalog, a brochure, a pamphlet, or a what? Will we insult him, if we ask for a catalog when he publishes a brochure?

Our pains increase when we finally receive his literature. We always ask for detailed information when we are seeking a particular product, but the brochure we receive may be beautifully illustrated with expensive drawings and photographs and filled with

AUTHOR'S NOTE: All product names mentioned herein are ficticious. Any similarity to names of actual products (living or dead) is coincidental.

paeans of praise for the product, and sadly lacking in that detailed information which we requested and which our designers badly need to fit the item to our plans. Sometimes—on the bottom of the last page in the book—there is a note in fine print, "Write for full details!" Which is exactly what we did in the first place!

We have searched across the nation for a catalog filing system that can be operated by a normal secretary, but—to date—everything suggested requires a Ph.D. in Library to even begin. Eons ago, when we were still in swaddling clothes, there were sweet songs of standards and standardization, but the effort is still just a minstrel's dream. One more thread on a pipe, one more bolt in a flange, one more blade on a fan and we have another item to classify and file! It is beyond the facilities of our feeble brains to fathom the felicities of these fabricators and their ways. We mostly suffer and sulk and envy the extravagance they exude.

We halt and hesitate when we scan the pages of the elaborate, tight-bound catalogs from our shelves that have no date of issue. In all innocence, our designers have, more than once, selected an item from such a volume and incorporated it, with all the details, on eight or ten sheets, and we, too, in the same innocence, have included same in our specifications. By the time the inquiry for purchase has gone out and umpteen sets of plans and specifications have been printed, the word comes through that the item is obsolete and has been out of production for several years. That's when the bosses hit the ceiling and bounce!

Is it any wonder that, when a new, loose-leaf, post-binder catalog, with index tabs and dates on each section drops from the mail bag, with a special note advising that replacement pages will be sent from time to time, we can feel almost normal and natural for a few minutes of our day?

It is small wonder then that in our sleep . . .

"We find ourselves engaged in nightmare conflicts with animated figures from the pages of these catalogs, brochures, pamphlets and what have you.

"We have been studwelded to T-trusses, covered with insulation blankets, coated with alumilated bitumatter, and cooled with refrigerationary air blasts from an Osi-flex-o-cratic punkah!

"We have worn out tons of bed springs wrestling with energized alphabetical groups led by skeleton-like 'A's, that were suspiciously similar to the abbreviations of the standard specifications that we dig through periodically, in search of a proper pipe or fitting.

"We pray that we won't have the same difficulty when we need a pipe for the hooka that we hope to smoke in paradise!

High Pressure Oxygen Equipment at Grace Ammonia Plant—Memphis

(*Starts on page* 69)

ufacture of fertilizers, explosives, plastics, chemicals and dyes. A large portion of the ammonia output at Grace will be converted to urea—particularly urea fertilizers.

Process Data

The heart of the Grace ammonia plant is its partial oxidation retort. This apparatus combines oxygen and natural gas (mostly methane) to produce what is called synthesis gas—a mixture of carbon monoxide and hydrogen. Though used in this case to manufacture ammonia, synthesis gas is potentially a basic raw material for the production of synthetic organic chemicals.

Prior to development of this high-pressure generator, oxygen-making units produced gaseous oxygen at atmospheric pressure. Therefore, wherever partial oxidation was carried out under high pressure, the oxygen had to be highly compressed before entering the partial oxidation retort.

Oxygen is an extremely difficult gas to compress. In attempts to compress gaseous oxygen to high pressures in reciprocating compressors, maintenance costs have been excessive. The new high-capacity, high-pressure generator will eliminate the need for these reciprocating gas compressors by compressing oxygen in its liquid state rather than its gaseous state.

While the oxygen from the generator is fed to the partial oxidation retort where synthesis gas is produced, nitrogen from the generator is piped off to be combined with the hydrogen of the synthesis gas in the manufacture of ammonia. In a later step, carbon dioxide formed from the carbon monoxide of the synthesis gas is combined with a portion of the ammonia output to make urea.

By producing oxygen at high pressure, the Air Products generator will help Grace reduce the cost of ammonia production. Part of the saving, Air Products points out, stems from the elimination of much of the power needed to compress synthesis gas in previous ammonia plants.

Synthesis gas is generally made by a process called steam-methane reforming, whereby carbon monoxide and hydrogen gas are generated at near atmospheric pressure by a reaction of methane gas with steam. Ammonia is usually produced at a pressure of about 200 atmospheres (3000 psi). With steam-methane reforming, therefore, the resulting synthesis gas has to be compressed about 200 times. But, under the new method, with synthesis gas formed at 28 atmospheres, the compression ratio need be only about seven to one.

If we really want to stop the trend toward a welfare state—

Let's Stop Asking

By GEORGE SMATHERS
United States Senator from Florida

ONE OF THE political conundrums of the day is tied closely to the problems arising from the federal government's distribution of taxpayer's largesse.

While there is both "viewing with alarm" and "pointing with pride" in the current scene, few can answer with any degree of confidence these questions:

Can we stop asking Washington for it?

Can we really resist the "Gimme Boys"?

I am a Jeffersonian Democrat and I am sincere in my convictions that Jefferson, a great leader in his day, had a true vision in pointing this nation toward a right and true course. Jefferson believed in little government.

"What is necessary," he asked in his First Inaugural, "to make us a happy and prosperous people?

"A wise and frugal government, which shall restrain men from injuring one another, which shall leave them otherwise free to regulate their own pursuits of industry and improvement, and shall not take from the mouth of labor the bread it has earned. This is the sum of good government."

It is not to examine how far we have strayed from Jefferson's preachments that I write, but to ask the questions stated above, and to ask you to inquire as to what direction we are heading.

To find our answer, we can get more lessons from history than we can draw from prophecy based on our own convictions.

There once lived a popular political leader who seemed destined to change the basic economic and political concepts of his nation. He had a good-background—he was a member of one of the nation's finest families, he had a good education and he had the ability to influence people with his charm of manner, his oratorical ability, and his manifest qualities of leadership.

It was virtually foreordained that he would become the administrative chief of his nation.

Attaining this post with its power, he set about to improve the lot of the common man with a paternalistic program of economic planning and social reform.

Prices and wages were set by government decree. All or virtually all of the tax load was placed upon the upper and middle income groups. Special benefits were provided to various groups, and government pensions, unemployment compensation, and regular grants in all categories of welfare were begun.

Government bureaus were set up throughout the nation to administer this program.

The leader's ego thrived. There are indications in the history of the period that he considered himself incapable of error.

But after a decade or less, the reform plans went awry, and both the common man and his uncommon neighbor were in trouble. The monetary structure of the nation sagged; the economic planning wasn't paying off. Money values were manipulated but this only added to the country's woes.

To cap the climax, members of the administration finally were caught stealing public funds.

After ten years, the country was weakened morally and near bankruptcy. The nation still had strength enough to remove from office the impractical reformer, and his abortive schemes were abandoned. But the damaging effects remained for a long time.

Called a savior and peerless leader at the height of his power, he later was termed by some historians as "charlatan" and "impostor."

His name was Wang An-Shih. He was head of the nation in China from 1069 to 1079.

Historians are not in full agreement on the long-range extent of injuries done by the ten years of political paternalism and economic planning. But history does record that the nation did not have the necessary moral and physical strength when some years later the godless hordes of Genghis Khan, bent on world

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Washington For It!

No. 7 of a series on problems of business and government

conquest, overran and plundered the whole country.

History tells us in other lessons of the dangers from the "Gimme Boys" who thrive on power seated in the central government. Back in the Seventeenth Century the individualism of the English common law saw dangers in a continuous resort to central authority for every need and every problem.

Lord Coke translated the well-known initials, S.P.Q.R., not as the Latin abbreviation for the "Senate and People of Rome" but as *"Stultus populus quaerit Roman"*—"A foolish people runneth to Rome."

Similar Dangers Exist Today

Too great reliance upon the distant and unwieldy central government dries up the springs of initiative and interest in local government upon which the life of a democratic and free people depends. It stimulates greedy requests for needless appropriations to serve local political promises regardless of the general economic welfare of the country. Moreover, it makes for inefficiency and waste.

No President, however competent and conscientious he may be, can possibly give adequate thought to the vast quantity of complex issues entrusted nowadays to the chief executive. No Congress, however hard-working, can possibly give thorough consideration to

SENATOR SMATHERS, at the age of 39, is one of the outstanding young men in the Federal government. In his first public office, assistant U. S. attorney in charge of the Miami (Florida) office in 1939-41, he attained such wide recognition that immediately following his three years with the U. S. Marine Corps during the war, he received a United States Attorney General appointment to prosecute war fraud cases where again he had an outstanding record. In 1946, heading a militant group of young people, he was elected a member of Congress, serving with such conspicuous success that in 1950 he achieved the political upset of the year by rather easily defeating the veteran Claude Pepper in a race for the U. S. Senate.

Let's Stop Asking Washington For It

(*Continued from preceding page*)

the huge stream of bills poured into the governmental hopper in Washington, or to the astronomical appropriations which the present overgrown central government is making and ever enlarging.

The endlessly staggering fact about the U. S. Government of 1953 is the number of things it has a policy about, and the profusion and power of its instruments.

Our government has a policy about Camel cigarettes as well as battery acids; it has policies about foot-and-mouth disease, color television and railroad fares as well as a would-be policy about the state's coastal waters and even the natural resources found on the property owned by some states.

It is true that some of these policies are decreed by Congress but some are the simple creations of administration and some have come to have the force of policy when based on nothing more than whim or political expedience of temporary holders of authority.

The U. S. Government has grown to be the biggest example of almost every material thing of which we have examples—the biggest employer (2,500,000), the biggest owner of capital assets, the biggest spender with an income of 68.7 billions and a budget of 70 billions (dollar estimates for 1953). This year it will buy something like 35 million pencils and 168 thousand erasers and 72,000 yards of red tape (they actually do use it—to bind documents). Its accumulated records would fill seven Pentagons and there is need for yet more space. For it is destroying old records at the rate of two million cubic feet a year, but filing away new paper at the rate of two and one-half million cubic feet a year.

Services Sound Alluring

No benefactor imaginable could ever offer you a fraction of the services and "things" you can get from your federal government. You may get a free education, a pension, a homestead in Alaska. You can get your old firearms identified, a Japanese sword classified, or a 30-day weather forecast. You can ask for dredging or damming of a stream, or government help to plan a small business or lay out a retail newspaper advertising campaign. You can get advice on fertilizers or plant pests, testing of your soil, or preparation of application for a government loan to build a farm.

For small sums you can buy art prints, "proof" coins, maps, two daily government newspapers, and any of 70,000 other publications on a variety of subjects. You can even buy rugs, a lighthouse, or an island through the government, but the sums involved are not nominal. The government will help you christen a mountain. It will even help you plan a community or find a missing person.

There are a great many other services your federal government renders. It helps support the needy blind and dependent; it builds highways, operates a barge line and a railroad, inspects meat, sells electric power, sponsors youth clubs, insures home loans and bank deposits (and lives); it tells housewives how to sew slip covers; it subsidizes ships, and airlines; it buys millions of pounds of eggs and butter.

It runs employment offices and settles strikes, loans cattle to the Indians, runs a film exchange, issues patents, supports farm prices and sells synthetic rubber, besides buying some of nearly everything produced in the country; it provides low-cost housing, protective tariffs, free navigation aids to shippers, medical care to veterans, and statistics to bankers.

Yet, with all that, we are not yet past the point of no return from the welfare state; we have plenty of room to maneuver within the framework of constitutional democracy.

Fortune Magazine editors say that with all of our services, "What has emerged is no 'welfare state' by British standards and certainly no police state by any standards. It is, however, a government engaged in a fabulous number of services to the citizens and restraints upon the citizen."

This system of services sounds alluring to the many of our citizens but we must not forget we give up something in return when we ask Washington for it.

It was because the creeping BIGNESS of government is to be feared that I, as virtually the sole member of the Senate to do so openly, opposed the creation of the new Department of Health, Education and Welfare. If we are not yet to the Welfare State point, I do not think we have sufficient expanse left to continue taking such broad steps in that direction.

Nineteen centuries ago, Plutarch wrote that:

"The first destroyer of the liberties of a people is he who first gave them bounties and largesse."

That wise man whose counsels have lived through the centuries was talking of the destruction of the Greek civilization by its conversion to a welfare state, and of the end of the Roman state, which did not learn the lesson from the Greeks and Egyptians.

The same truths which filled Greece and Rome will destroy us. Why should we be exempt? If we are to look to Washington to fill every need, as the Greeks looked to Athens, and as the citizens of the Empire looked to Rome, what are we losing? Is our individual freedom less important than comfort? Our forefathers came to this country seeking not comforts and "security" but a freedom that knows no bounds, and they achieved their goal literally through blood, sweat, and tears; and with all the hardship, suffering and sacrifice, the fruits of their victories were sweet and few turned back.

Without this God-given liberty which always must be wrested from the world, we can still have security. The totalitarian state offers "security"; we must want more.

The great liberal minister of Washington, Dr. Powell Davies, tells us that "Democracy as contrasted with Marxism is founded upon the significance of the individual." He says:

"It is this significance that is fundamental and not the collective significance of the society . . . What it does mean is that the society shall liberate the individual and not dominate him; that it shall enhance his significance and not belittle him; that it shall invite his free participation and not enslave him;

that it shall respect him and not demean him. The government is his servant and not his master; his leaders are his agents, not his rulers; his fellow men are individuals like himself, his neighbors and his fellow citizens, not fellow subjects. For democracy is founded upon the significance of the individual."

And of the "State versus the Individual," Louis Bromfield, the farmer and author, writes that a struggle is going on to make man subject to "a vague but tyrannical impersonal machine known as the state," and he adds:

"This system of using bribes, subsidies, promises, and so forth as a pain-killer confused many—indeed most people—for a considerable time, and only since we have begun to see the results in operation has it become apparent, even to the simplest fellow, that when the pain-killer wears off, the pain, in terms of insecurity, and material cost, is much worse than ever. We, as a nation, have been very fortunate in having placed before us a laboratory example of how the 'womb to tomb' pattern works out. With us, the menace of this false and unworkable political philosophy has crept up slowly and gradually."

On the same subject, David Lawrence, a great editor and columnist in Washington through many administrations, said recently:

"Capitalism is a desirable system primarily because it alone recognizes the dignity of the individual. Its moral stature is derived from the great Judeo-Christian tradition which for centuries has embodied the ideal men strive for. . . . But let us not fail to perceive that the power of self-regulation, based on moral and spiritual values, is, after all, the greatest single virtue that nourishes a healthy capitalism. Let us demonstrate to skeptics far and wide that a healthy capitalism means a healthy individualism and that this is the true prescription for communal well-being."

These basic American concepts of freedom as we know them in this nation from the days of Thomas Jefferson to the present are unchanged. One of the developers of atomic power, Dr. Vannevar Bush, warns us that "A people bent on soft security, surrendering their birthright of individual self-reliance for favors . . . will not measure up to competition with a tough dictatorship . . . The Russian threat cannot be met if we turn this country into a wishy-washy imitation of totalitarianism, where every man's hand is out for pabulum and virile creativeness has given place to the patronizing favor of swollen bureaucracy."

I recently read the story of Glenville, West Virginia. For fifty years the people had complained of floods from the Little Kanawha River which two or three times each year overflowed its banks and flowed down Main Street. The day finally came when something had to be done. When that day arrived, everybody pitched in and helped. The people raised several thousand dollars among themselves to finance a small-scale flood control project.

Local industries donated bulldozers and other heavy equipment needed to clean up the river bed and clear the banks of underbrush. Women helped, too. They cooked enough food to feed the 500 men who worked with shovels and pickaxes to clear the banks. Property owners along the river also did their share. Nowadays the folks in Glenville can breathe easier. There hasn't been a single flood since the project was finished. And not a penny of federal money was received or asked for the work.

How far can the rest of our nation go along the path indicated by little Glenville, West Virginia?

To a large extent, Stalin is responsible for much of the Bigness in which we are involved today, and the threat which Stalin in death bequeathed to us does not give us too much hope for assurance of peace in the immediate future.

But what about the way our citizens are thinking about the question of big government? What will be their response when, after being told during a campaign they can look for less government and less bureaucracy, their new administration gives them more Super-Bureaucracy?

Aside from the Stalin-inspired bigness, all other government expansion is done in the name of that elastic phrase, "The general welfare." We have no cause for optimism if we are forced to agree with the skeptics who say the "ordinary" citizen sees no difference between "the general welfare" and his own individual welfare.

Let's draw a line where we will stop asking Washington for it. Remember that even as late as 1942, the Supreme Court held that "It is hardly lack of due process for the government to regulate that which it subsidizes."

The Bible puts it more simply (*Proverbs* 22:7):

"The borrower is the servant to the lender."

Concrete Floor Topping Technique

(*Starts on page* 61)

ally used. Emery is tough but isn't so abrasive. It will last longer but won't give you as much of a non-skid quality as other types.

The high density floors are "impervious" to oil spillage, provided the surface is given normal care. An ordinary concrete floor with its relatively low density would almost immediately absorb any oil spilled upon it. A subsequent washing would have little effect because the oil would already be impregnated in the concrete. This condition inevitably leads to quick deterioration of the floor.

High density of the Kalman floor prevents this quick absorption, and if the floor is given normal care, the oil will not seep through the surface. However, if it is allowed to remain on the floor for some time, some staining action might occur but the density of the floor prevents complete penetration.

Other industrial advantages include high non-dusting characteristics; a hard, uniform surface free from breaks and surface ruts (ideal for materials handling equipment); and a floor capable of maintaining excellent wearing surfaces over a substantially long period of time.

Electrical Equipment Fundamentals

By A. T. LOHKAMP, Superintendent of Power Plant,
Pasco Packing Co., Dade City, Florida

Part 5—Single Phase Motors

This is the fifth of a series of 7 "Q & A" articles presented to help plant men become more intimately acquainted with the electrical equipment in their charge. A thorough understanding of the points covered will improve operation and maintenance, and help employees advance to higher positions.

Installments of this Series Include:

Part 1—Operation and Maintenance	*Jan. '53*
Part 2—Distribution and Controls	*Feb. '53*
Part 3—Synchronous Motors	*Mar. '53*
Part 4—Three Phase Induction Motors	*Apr. '53*
Part 5—Single Phase Motors	*This Issue*
Part 6—Technical and Design Data	*July '53*
Part 7—Selecting Generators and Motors	*Aug. '53*

Q—What are the principal differences between polyphase and single phase induction motors?

A—Polyphase motors have two or three separate windings, one for each phase, usually distributed uniformly around the inner circumference of the stator. The currents in these windings alternate progressively and continually so as to produce a uniformly revolving field that drags the rotor around with it.

In a single phase induction motor there is but one winding, the alternating current in which produces a magnetic field that also alternates in polarity but does not tend to revolve. That is, it has no starting torque and tends to act like a single cylinder engine at dead center. If a slight auxiliary torque is provided the motor starts in either direction, depending on the direction of this torque, and soon accelerates up to normal speed. In very small motors this torque was formerly provided manually; now practically all single phase induction motors have some auxiliary means for starting.

When up to speed this motor operates somewhat like a polyphase machine, although it is very limited in overload capacity and is not built in large sizes. Its efficiency is slightly lower than that of a polyphase motor of the same power rating and its power factor is also lower.

Q—What are the types of single phase motors?

A—Single phase motors may be divided into two principal classes: split phase motors and commutator motors. The split phase type is subdivided into resistance-start, reactor-start, capacitor-start, and capacitor motors. The commutator type motors are subdivided into two groups: series and repulsion. Each of these is divided into several types and combinations of types. These two groups and subdivisions represent various electrical modifications of single phase induction motors, some one of which must be used to produce the required starting torque.

Q—What is a split phase motor?

A—A split phase motor is a single phase induction motor equipped with an auxiliary winding in shunt with the main stator winding and differing from it in both phase and spacing. The auxiliary winding is usually opened by a centrifugal device when the motor has attained a predetermined speed. The fields of these two windings act upon the rotor to produce a small starting torque.

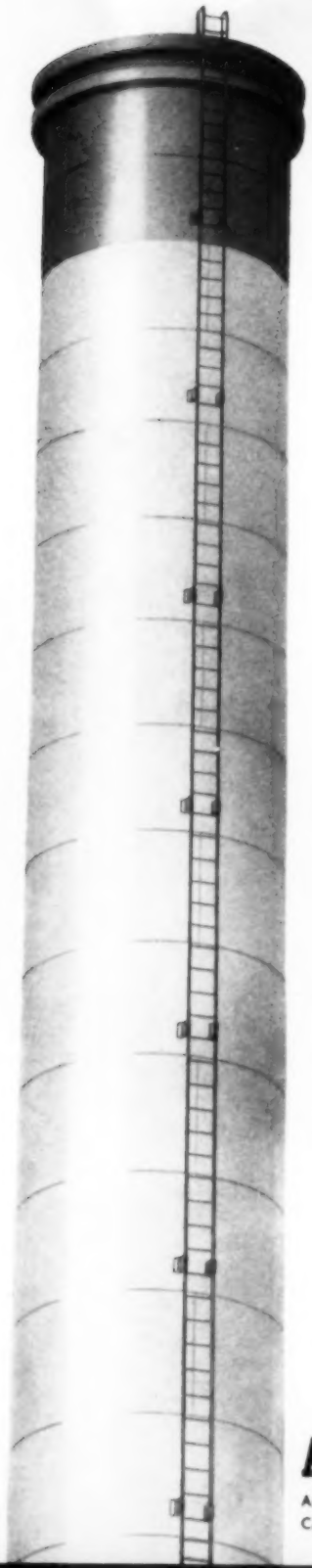
There are four methods of increasing the starting torque by increasing the phase angle between the main winding and the auxiliary winding so as to produce a revolving magnetic field similar to a three phase motor.

(1) Resistance-start motor.

A resistance-start motor is a form of split phase motor having a resistance connected in series with the auxiliary winding, the auxiliary winding being opened when the motor has come up to a predetermined speed.

(*Continued on page* 101)

American Blower . . . a time-honored name in air handling



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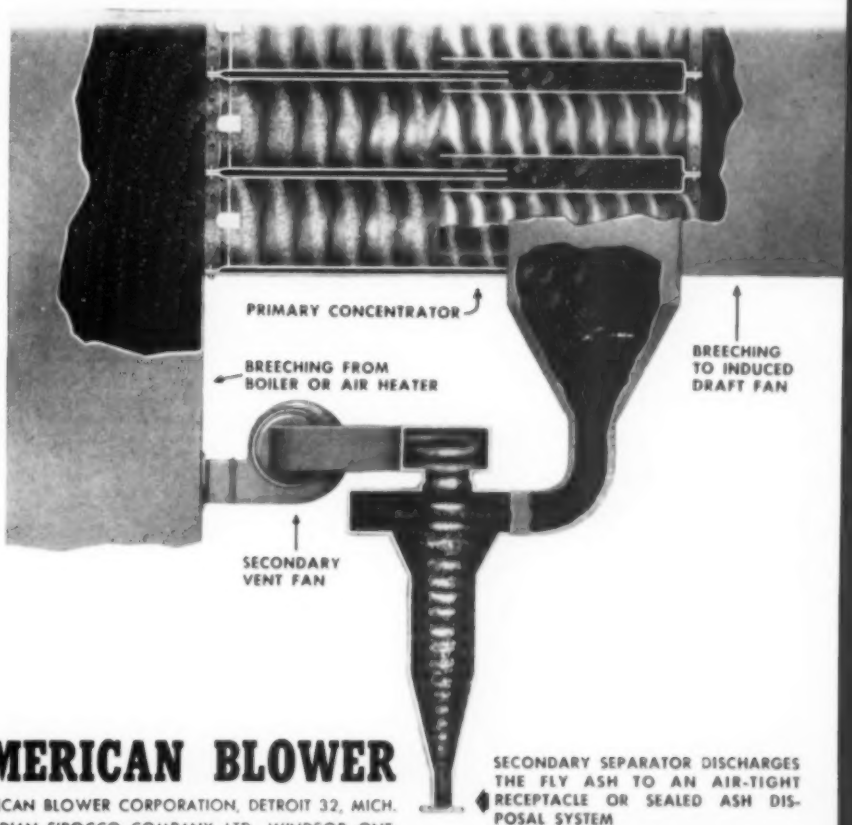
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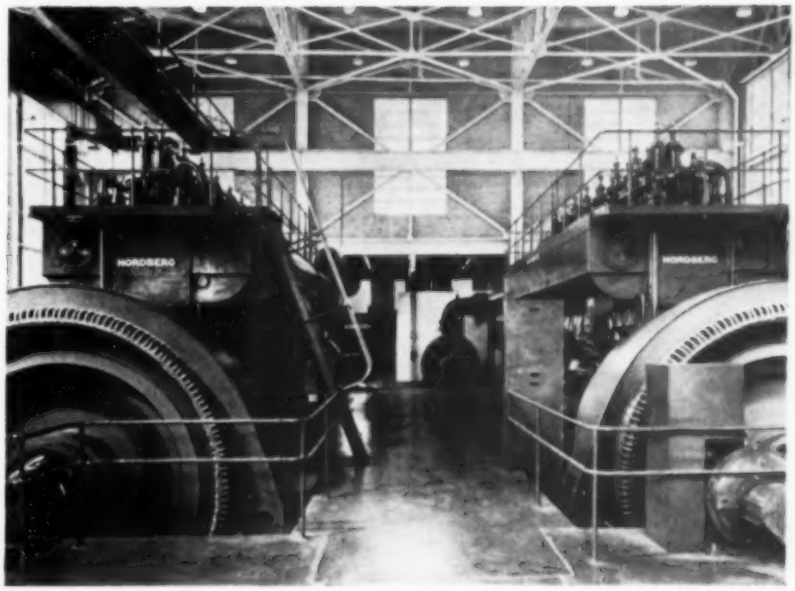
W. T. Elliott,
Power Plant Supt.,
says...



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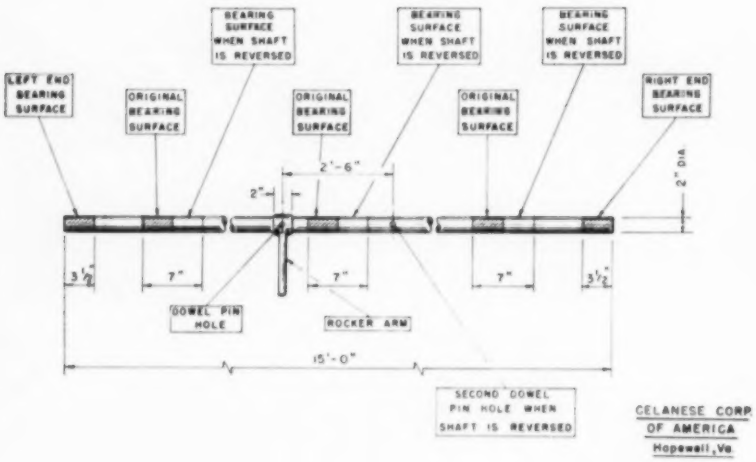


Metallizing Replaces Brazing in Repair of Machine Shafts

DIMENSIONS of bearing areas on a textile knitting machine rocker shaft used at the Celanese Corporation of America in Hopewell, Virginia, are illustrated.

The shaft is 2 in. in diameter and 15 ft long and is used to control the up-and-down motion of the "heddle" in a knitting machine. The rocker shaft, which is made of cold-rolled steel, moves back and forth in 5 cast-iron bearings, each approximately 3 in. long, and is controlled by a rocker arm held fast to the shaft with a dowel pin. They normally wear on all five bearing areas and can cause inefficient operation unless repaired or replaced. They can be reversed once as indicated by the drawing.

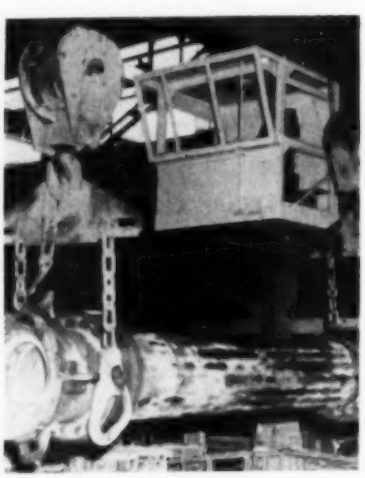
Each of the worn areas are turned down ⅛ in. on the diameter, rough threaded with a Rex AAA carbide tool and metallized with a 25 carbon steel, using ⅛ in. wire in a Metco 2E gun. The metallized areas are then turned down to the original 2 in. diameter.

Mr. H. Tobler, Plant Engineer, emphasizes that before they began using metallizing they would braze the worn areas on the rocker shafts, but this took twice the time and cost twice as much for materials. This metallizing user stated that a new rocker shaft costs about $80.00, but none has been purchased since the company began using metallizing in 1944.

Crane Cab Cooler Protects Operator

TAR FUMES arising from dipping tanks in a foundry created an annoying situation for the hot-metal crane operators. The fumes contain acridine, which causes headache, eye soreness and inflammation of the mucous membranes. Also of considerable nuisance was sand, dust and steam in the atmosphere as well as the excessively high temperature present at the crane level.

To protect the operator against these perception dulling hazards the crane cab was enclosed and fitted with a sloping front window which permits the operator to lean forward and get the best possible



working view of the floor below. A Dravo crane cab cooler, mounted on the bridge above, furnishes filtered, odor-free and cooled air to ventilate the cab. Working in a comfortable atmosphere of 80 to 85 degrees F in summer and 68 to 72 F in winter, the operator is no longer affected by distracting conditions and remains alert to the dangers involved with handling molten metal.

$$$ For Your Ideas

Send your ideas, methods and short-cuts to Southern Power & Industry. Payment is made for suitable material—a photo or rough sketch will make your idea more valuable.

Articles from maintenance and production men in Southern and Southwestern plants are preferred. Material must not have appeared elsewhere nor been sent to another publication.

Switch Eliminates Crane Mishaps

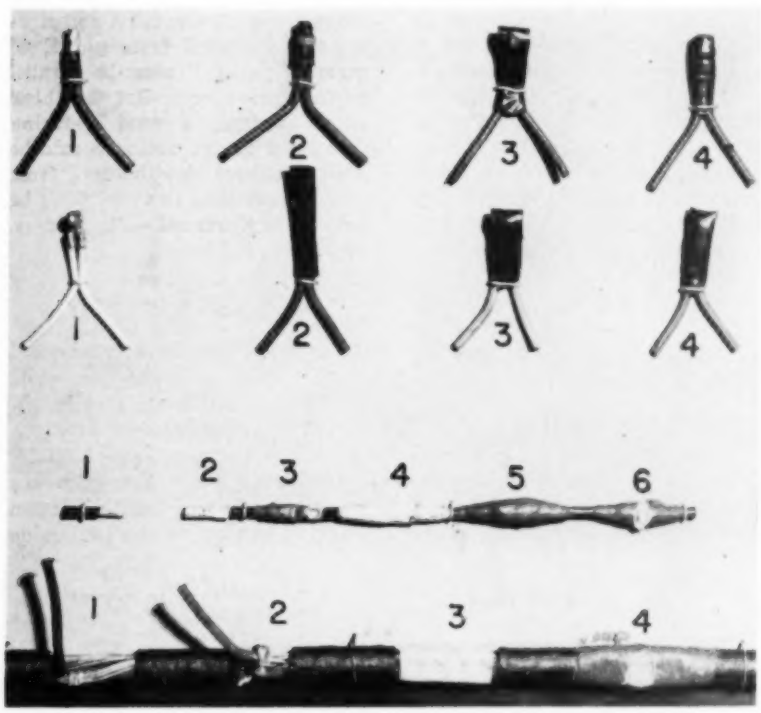
A SERIES of crane mishaps throughout our many heavy duty buildings suggested the need for an extensive study of the layout to check on improvements in crane handling techniques.

High summer temperatures up under the roof required the installation of a dry type transformer to step down the 460 volt power supply to the conventional 115 volts for operation of a 16 in. fan and a siren to replace a defective gong.

The totally enclosed sheet metal cab railing was improved by substituting expanded metal to permit the breezes to waft through to cool the operator.

Still other improvements were provided by installing a mechanical water cooler on the landing platform convenient to all four crane men in the building and providing an automatic phone station to keep these otherwise badly isolated persons in touch with other workmen.

In anticipation of the possibility of a man being overcome by accidentally liberated fumes, or perhaps fainting, we installed a Faraday W P 35 S floor type switch in the pilot circuit which would bring the entire crane to a gentle halt should foot pressure be removed from the button. Some griping occurred, of course, since the men claimed that the need to keep pressure on the switch restricted their movement about the cab, but as they noticed how very effectively the crane movement stopped as they absentmindedly removed a foot from the switch, they were convinced of the need for such a protective device.—*Paul Ziemke, Oak Ridge, Tenn.*



Display Board Guides Electricians

ELECTRICAL connections and contacts for wiring in industrial plants must be properly and carefully made if they are to be expected to stand up through the years.

In order to assure uniformly good work, Cone Mills Corporation, Greensboro, N. C., has had their electric shop make up a number of display boards showing standard methods for making those types of electrical connections which are most frequently encountered in mill wiring. These boards show all the steps required to make the connections, and cut-away samples show the construction of the completed job.

A display board has been made for each mill's electrical shop so that the same type of connections will be made in all the mills in the Cone group.

The photograph of one of the display boards shows how various types of electrical connections should be made.

TOP ROW: This type of connection is suitable for lighting wiring. 1. Put splice cap (Buchanan or equal) over wires and solder and crimp. 2. Cover splice with rubber insulating cap. 3. Cover the cap with an endwise layer of rubber Scotch tape. 4. Wrap connection completely with Rubber Scotch tape.

2ND ROW: This type of connection should be used on wiring for small motors or other loads of that nature. 1. Fasten ends with StaKon lug or equal. Crimp and solder. 2. Cover this joint with insulation sleeving (spaghetti) about 3 in. long. 3. Fold over insulating sleeving and cover endwise with a strip of tape. 4. Cover entire joint with rubber Scotch tape.

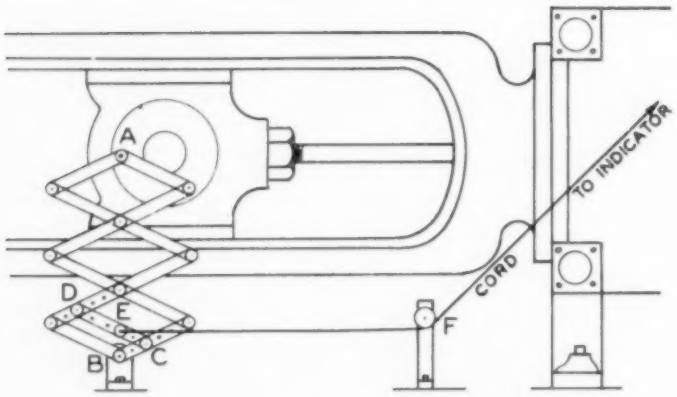
3RD ROW: This connection is used on 600 volt power circuits and similar circuits using medium sizes of stranded wire. 1. The stranded wire is tinned. 2. A compression sleeve is used to join the two ends. 3. The joint is covered with two layers of cotton tape, half lap, and painted with air drying varnish or shellac. 4. Two or more layers (depending on voltage) of varnished cambric tape, half lap, are put on over the cotton tape while the varnish is still wet. 5. Finally, the joint is covered with two more layers of cotton tape and again varnished. 6. This shows a cut-away view of the finished joint.

BOTTOM ROW: This shows two types of joints for connecting small wire to large cable, and one type of joint for connecting cable to cable. 1. The small lead is wrapped around several strands of the large cable, and the joint is soldered. 2. An alternate method uses a mechanical connector and no solder. Strands are tinned before making the joint. This makes a quick joint, but it is bulkier and harder to insulate. 3. This shows a cable to cable joint made with a compression sleeve. No solder is used, but the strands are tinned before splicing. All of these connections shown on this row should be covered with cotton and varnished cambric tape as described for 3rd row. 4. This shows a cut-away of a completely covered joint.

Correct Use of Pantograph

SEVERAL years ago I was hired as engineer of a textile mill power plant having a 24" and 48" x 42" cross compound Corliss condensing engine directly connected to a 750 kw direct current generator for driving the motors through the mill. When I took charge, I found that the engine would not carry all of the machinery at the same time.

The company had two steam engine indicators of the best make and two pantograph reducing motions that were in good condition, but the pin E of the pantograph was not in a straight line with stud A and pivot B. Therefore, the drum of the indicator did not give a truly proportional reduction of the piston travel. The engineers had adjusted the cutoff to show the same at both ends of the card, yet the terminal pressure was very much higher at one end than the other. This should have shown them that something was wrong.



After getting the movable bar and pin E in position to give the indicator drum the desired travel, the valves were set and cut-off adjusted and the engine carried all the machinery. And after getting the tubes of a counter current surface condenser clean so that it would maintain 26 in. of vacuum, more machinery was added and all was carried with ease and less coal was burned daily.

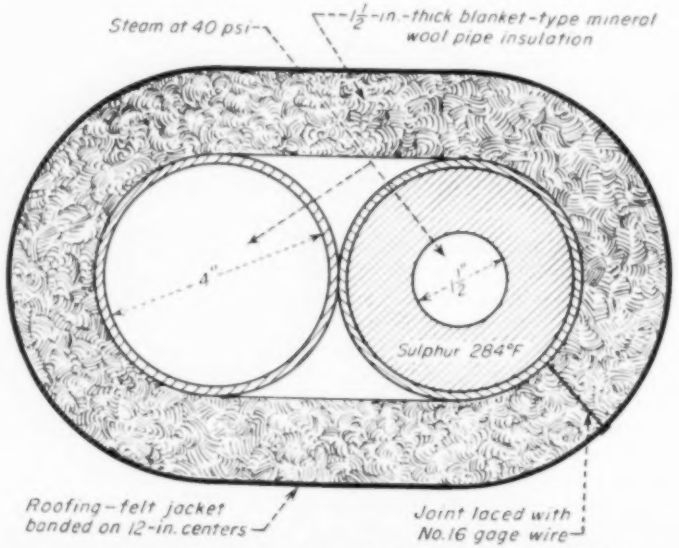
A well made pantograph, carefully handled, will give a perfect reduction. Pin E must always be in a straight line with stud A and pivot B; also the cord from pin E to carrying pulley F must be parallel to the piston rod. But for high speed engines, a good reducing wheel and detent motion should be used, and here also the cord from stud in crosshead to wheel must be parallel to piston rod.—*M. S. Jones. Baltimore, Md.*

Flexible, Blanket-Type Insulation Covers Parallel Pipes at Low Cost

WHEREVER pipes are parallel, close together and contain temperature-compatible materials, it is often economical and equally as effective to insulate the entire group as a unit. Most pipes go their own way in servicing process equipment and must be individually insulated. On the other hand, many parallel pipe runs are so short that the savings in group insulation are small. But the reduced cost of pipe insulation and application time becomes significant when two or more pipelines are parallel in long runs.

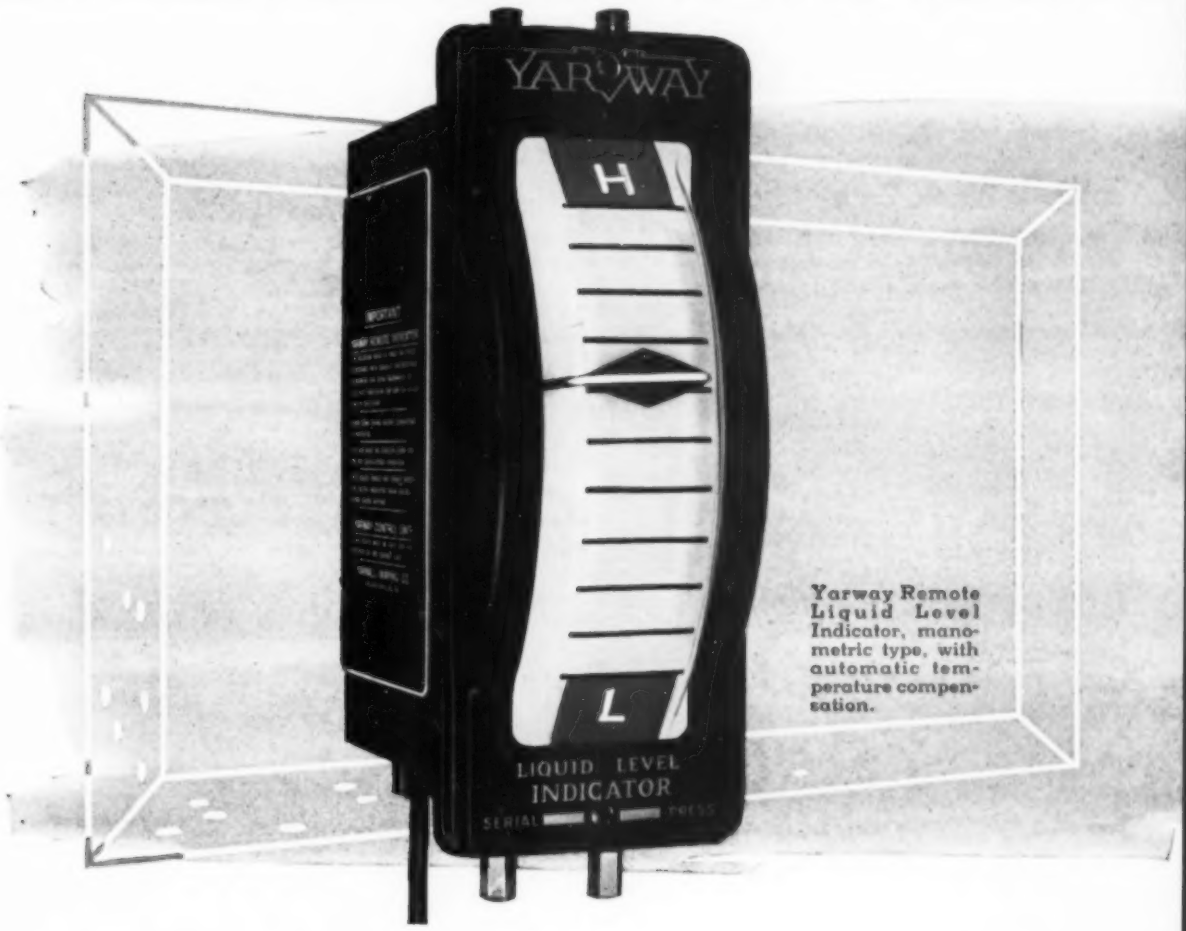
For example, the insulating method on a pair of parallel lines in a long elevated run is detailed in the drawing. Process steam at 40 psi (or 267 F) and molten sulphur at 284 F are carried in the two 4-in. pipelines, the sulphur line being internally traced by a coaxial 1½-in. steam line.

Mineral wool blanket-type pipe insulation in 24-in.-long sections was wrapped around both pipes, laced tightly at the joint with 16-gage galvanized iron wire, and banded at about 12-in. intervals. A weather-resistant roofing-felt jacket was then applied over the insulation and also banded on 12-in. centers. Since the lines are entirely exposed, the insulation joint is located on the underside



Cross section of parallel lines shows details of insulation application.

What's New
IN BOILER WATER LEVEL INDICATION?



Yarway Remote Liquid Level Indicator, manometric type, with automatic temperature compensation.

IMPROVED *WIDE VISION* REMOTE LIQUID LEVEL INDICATOR

A new-type face on the Yarway Remote Liquid Level Indicator now permits side as well as head-on dial readings. This vastly improved visibility makes it possible to check boiler water levels from most any position in the control room, or wherever the Yarway Remote Indicator may be installed.

MANOMETRIC TYPE

The Yarway Indicator is a manometric type with automatic temperature compensation. Level readings are instant and accurate because the indicator is operated by the boiler water itself. The indicating mechanism is never under pressure. There are no stuffing boxes.

Over 8,000 Yarway Remote Liquid Level Indicators are successfully operating throughout industry—primarily for indicating boiler water levels, but also for many other liquid level applications, and for superheater pressure differential indication aboard ship.

For full information on Yarway Indicators, write for Yarway Bulletin WG-1823.

YARNALL-WARING COMPANY *Home Office:* 116 Mermaid Ave., Philadelphia 18, Pa.

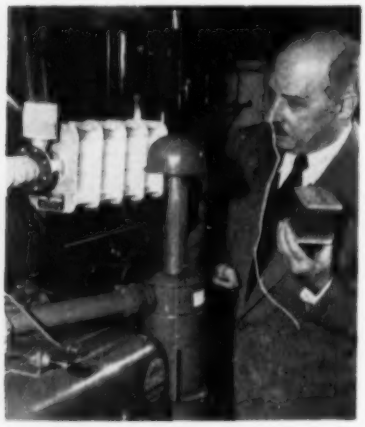
Southern Representative: ROGER A. MARTIN, Bona Allen Building, Atlanta 3, Ga.

YARWAY® STEAM PLANT EQUIPMENT

and the roofing felt is lapped downward about 3-in. Whether parallel pipes are indoors or outdoors and contain steam, molten sulphur, asphalt, water or any other heated material, flexible blanket-type pipe insulation applied in this manner can maintain process temperatures efficiently and economically.

Fork Truck Fume Killer

A catalytic fork-truck muffler that removes noxious carbon monoxide and hydrocarbon fumes issuing from gasoline engines was in operation at the recent Material Handling Exposition in Philadelphia.



Eugene J. Houdry, inventor of the OCM Catalytic Exhaust System, studies one of his units undergoing test on a gasoline engine. He is holding an Oxycat in his left hand, similar to the four units that comprise the muffler under test. OCM mufflers, which come in standard sizes for any make or size of fork-lift truck, contain two, three, or more individual cartridges, depending on size of truck engine.

Known as the OCM Catalytic Exhaust System (Oxy-Catalyst, Inc., Wayne, Pa.) device permits drivers to operate fork-lift trucks with complete safety in confined plant areas.

The Oxycat, in the OCM exhaust system, is a cartridge of spaced porcelain rods coated with a catalytic agent (catalytic alumina and a platinum alloy). Engine exhaust flows across the surface of the rods where combustion of carbon monoxide and other harmful vapors takes place. On leaving the catalyst, exhaust contains mostly carbon dioxide and water vapor, and only slight traces of original contaminants.

New Granite Drilling Technique Demonstrated Near San Antonio

THE NEW Bassinger Percussion Drill, which is something like a double action pile driving hammer, was recently tested at the Institute of Inventive Research near San Antonio.

Powered by 400 lb steam pressure, supplied by a Vapor-Clarkson steam generator, the unit drilled a 4½ in. hole through a 32 in. block of granite in 3 min 35 sec.

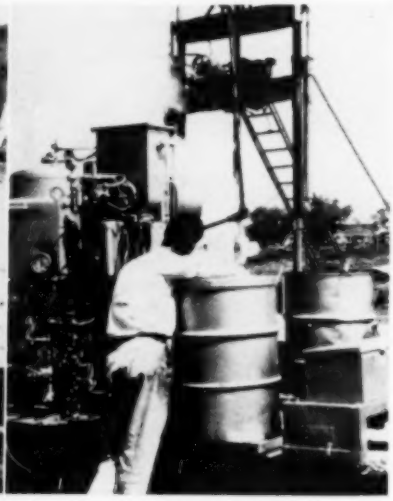
The portable drill is designed to beat on solid head bits because the impact is so severe it breaks the teeth on rotary bits. The four tungsten carbide inserts in the bit head look good as new after drilling several 32 in. holes in granite. The bit heads are made in various sizes from 4½ to 12 in.

Exhaust steam from the hammer piston is ejected out one center hole at the bottom of the drill between the inserts and effectively carries away the chips and grindings.

Tests indicated that it takes about 2400 lb of steam an hour at a sustained 400 lb pressure to operate the 4½ in. Bassinger Drill.

The full 400 lb working steam pressure was developed in about 3 min by the Vapor-Clarkson steam generator from cold water. Steam was lubricated by a Texsteam Injector pump, which forced into the steam about one quart of lubricant per hour. A high pressure steam reservoir was mounted on the trailer to smooth out hammer operation.

400 lb steam pressure is operating the new Bassinger Percussion Drill which is drilling a 4½ in. hole through this 32 in. block of granite in 3 min 35 sec. Steam hydraulic lift and speed of rotation controls are at the right.



Inventor Ross Bassinger holds one of the bit heads which incorporate tungsten carbide inserts. Steam is ejected out of the hole in the bottom of the bit carrying away chips and dust.
The portable Vapor-Clarkson steam generator at the right automatically produces 400 lb sustained steam pressure and 2400 lb/hr to operate the drill. Texsteam Corporation of Houston (division of Vapor Heating Corporation) loaned the steam generator for these tests. It took about 3 min for the steam generator (burning No. 2 fuel oil) to build up 400 lb working steam pressure from cold water.

NEWS *for the South and Southwest*

The South's Newest Chemical Center

More than $30 million invested in new chemical and industrial center at Calvert City, Kentucky. Chemical complex of independent organizations coordinate their production.

CALVERT CITY, KY., seven years ago a small farming community in western Kentucky, recently came of age as a new chemical and industrial center with the dedication of three new chemical plants.

These are the $8,000,000 chlorine-caustic soda plant of the PENNSYLVANIA SALT MANUFACTURING CO., pioneer manufacturer in the area; the $10,000,000 calcium carbide and acetylene generating plant of the AIR REDUCTION COMPANY, and the $6,000,000 vinyl chloride plant of the B. F. GOODRICH CHEMICAL CO.

Along with the plant of the PITTSBURGH METALLURGICAL CO., second industry in the area, and Pennsalt's hydrofluoric and sulfuric acid facilities, completed in 1949, this makes a total of more than $30,000,000 in new industrial investment in this area. Approximately $9,000,000 of new construction is now being added to present facilities and further additions are being studied.

The new era for Calvert City began with the completion of the Kentucky Dam on the Tennessee River at nearby Gilbertsville in 1944. This dam, biggest in the TVA system, is the keystone of what is rapidly becoming one of the largest concentrations of electric power in the country. This, plus the fact that Calvert City is located near the confluence of the Tennessee and Ohio Rivers, the heart

A panorama of the new riverfront industrial area in *Calvert City, Kentucky. Pennsylvania Salt's* hydrofluoric and sulfuric acid plants are in the immediate foreground with their new electrolytic chlor-caustic unit in the middle background. Directly beyond this is *Pittsburgh Metallurgical's* alloy plant (second industry in area). *Air Reduction's* big, new calcium carbide and acetylene plant and *B. F. Goodrich Chemical's* new vinyl chloride plant are in the far background.
The new plants will add some 400 new industrial jobs to more than 400 created since Pennsalt's first plant went into operation in 1949, and will bring the annual industrial payroll of the Calvert City, Kentucky, area to an estimated $3 million.

of the inland waterways system, and on the Illinois Central Railroad, and is within easy shipping distance of large sources of raw material, made it a logical location for America's newest chemical center.

Production Coordinated

The new center constitutes a chemical complex of independent organizations coordinating their production. Chlorine and hydrogen from Pennsalt's new plant will be combined to make anhydrous hydrogen chloride. This and acetylene from Air Reduction's plant is sent by pipeline to the B. F. Goodrich Chemical Co. plant, where they are combined to make vinyl chloride monomer.

Further possibilities of such operations are seen in unique combination of basic chemical production of the area, which include chlorine, caustic soda, acetylene, hydrofluoric acid, sulfuric acid, hydrogen chloride, hydrogen and several related products. With this in view both Pennsalt and Air Reduction have acquired additional industrial land, either for their own use or that of other industries which may use these products.

The PENNSALT plant, one of its four electrolytic chlorcaustic producers, marks a departure from usual practice in that it employs new DeNora mercury cells. These cells, developed in Italy and licensed in America by the Monsanto Chemical Co., are not only efficient chlorine producers but provide a high strength caustic soda of rayon grade (high purity) without further evaporation or purification.

Salt for this operation will be brought in by barge from the Gulf area. Power is supplied under long term contract by TVA. The chlorcaustic unit was built by the Leonard Construction Co.; the anhydrous hydrogen chloride unit by the Girdler Corp. and new dock facilities by the Dravo Corp. The entire project was under the supervision of Pennsalt's Central Engineering Department.

The AIR REDUCTION COMPANY calcium carbide and acetylene plant, a unit of its National Carbide Company division, began operations in January and almost simultaneously announced plans to double the 142,500 tons per year rated capacity plant. The two additional furnaces are now under construction and are expected to be in operation early in 1954. According to Airco, the decision to expand the plant was made in order to meet steadily increasing chemical industry demands for acetylene generated from calcium carbide. Acetylene is used as a raw material in the manufacture of various synthetics and plastics.

The B. F. GOODRICH CHEMICAL COMPANY plant is a result of the rapid growth in the plastics industry. This plant produces vinyl chloride monomer for shipment by tank car to B. F. Goodrich Chemical Company's plants at Avon Lake, Ohio and Louisville, Kentucky.

Tom B. Nantz is manager of the new B. F. Goodrich Chemical Company plant, which represents a capital investment of about six million dollars in engineering and construction costs. Contractor for the work was the Girdler Corporation. Plant facilities in addition to the manufacturing sections include service and maintenance groups, offices, and power plant. Initial production of vinyl chloride monomer was in February, 1953, and full capacity will be reached sometime during the summer.

Newport Industries Expansion

THE RUST ENGINEERING COMPANY, 2109 Fifth Ave. North, Birmingham, Ala., has been awarded a contract for the construction of a new tall oil processing plant for NEWPORT INDUSTRIES, INC. at BAY MINETTE, ALA.

The new plant will provide capacity for additional demands for products now manufactured, and for a number of new products. Raw material from kraft paper mills in the area will be processed into products used in the manufacture of soap, lubricants, resins, paints and for other industrial uses.

The estimated cost of the plant is $2,700,000 and construction work has already started.

Mechanical Contractors Supply Holds Dealer Meeting in Winter Park, Fla.

MECHANICAL CONTRACTORS SUPPLY, INC., sole distributor for General Electric heating and air conditioning equipment in Florida, held a dealer meeting recently at the company's Winter Park headquarters. The new 1953 line of General Electric products was presented and discussed.

The G-E heat pump, available in 3 or 5 ton capacities, was one of the new products featured. It is the "air to air" type which requires no accessory equipment, eliminating the need for fuel systems, chimneys, cooling towers, and extensive piping. Other presentations featured commercial and residential air conditioning equipment.

Paul Spellman and George Collins, executives of Mechanical Contractors Supply, Inc., were assisted in the statewide dealer meeting by personnel of the General Electric Co.

FUTURE EVENTS
Of Engineering Interest

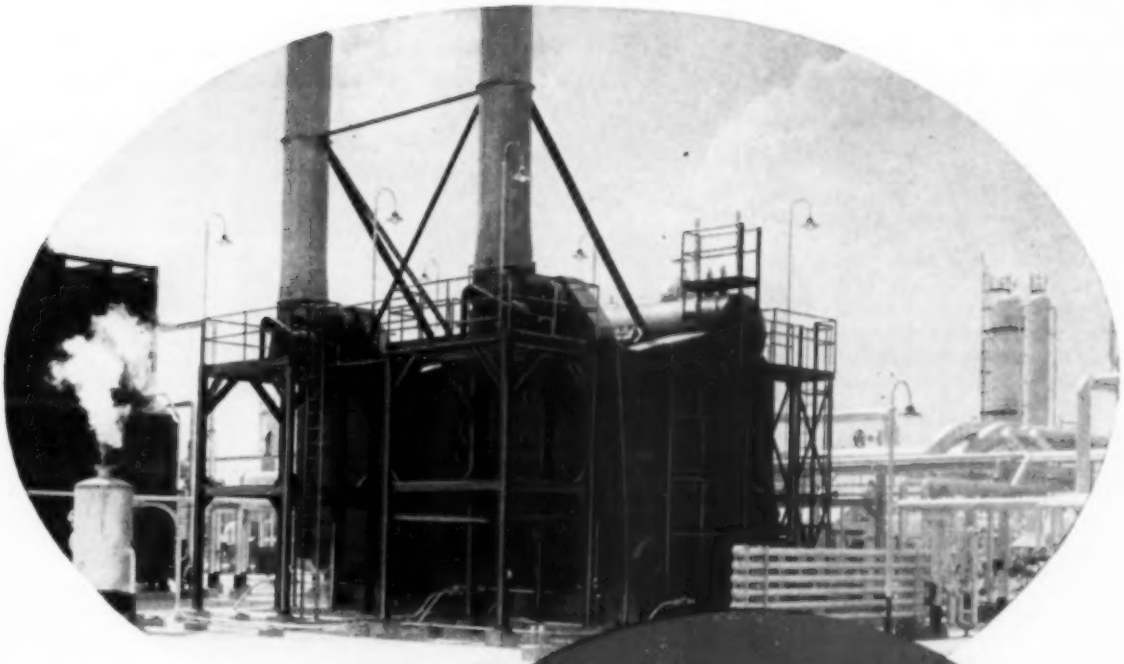
AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION, George W. Craigie, Sec'y, 229 East 42nd St., New York 17, N. Y.
June 9-11, Meeting, Atlanta Biltmore Hotel, Atlanta, Georgia.

EXPOSITION OF BASIC MATERIALS FOR INDUSTRY, Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.
June 15-19, Exposition and Conference, Grand Central Palace, New York 17, N. Y.

AMERICAN WELDING SOCIETY, National Secretary, 33 West 39th St., New York 18, N. Y.
June 16-19, National Spring Technical Meeting with Welding and Allied industry Exposition, Shamrock Hotel and Hall of Exhibits, Houston, Texas.

AMERICAN SOCIETY FOR TESTING MATERIALS, Sheldon E. Fitterer, Development, 1916 Race St., Philadelphia 3, Pa.
June 29-July 3, 56th Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS, A. B. Campbell, Exec. Sec'y, 1061 M & M Bldg., Houston 2, Texas.
Oct. 7-9, South Central Region, Meeting, Mayo Hotel, Tulsa, Okla.



Wickes steam generators help refineries operate efficiently year after year

147

Year after year, Wickes Steam Generators have been helping the oil processing industry keep their operations efficient and their maintenance and operating costs low. In many of America's largest refineries and natural gasoline plants, Wickes boilers have been on the job almost constantly for ten, twenty or even thirty years and are still operating at a high degree of efficiency. They can do the same in your plant. Wickes can fill your requirements for any type of multiple drum boiler up to 250,000 lbs. steam per hour at 1000 psi., adaptable to any standard method of firing. Units capable of steam production up to 35,000 lbs. per hour at 1000 psi. can be shop-assembled for immediate installation. Consult your nearest Wickes representative or write us today for descriptive literature and complete information.

Wickes

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Chase Brass & Copper Co. Promotes Barzler, Houston

PAYNE C. BARZLER, JR., who has been Southern Texas sales representative of CHASE BRASS & COPPER CO., INCORPORATED, subsidiary of Kennecott Copper Corporation, has been named District Manager of this newly-created sales district in HOUSTON, TEXAS.

The new sales office and branch warehouse is located at 16 Drennan Street, Houston. Substantial stocks of all types of brass mill products are carried, together with selected wire mill and miscellaneous products.

Southern Paperboard, Georgia

THE SOUTHERN PAPERBOARD CORPORATION, PORT WENTWORTH, GEORGIA, has started on a major expansion program to increase substantially the mill's capacity. Additions are also necessary to the pulp mill, and include one new boiler, a turbine, three digesters and a new refining capacity.

THE J. E. SIRRINE COMPANY of Greenville, South Carolina, are engineers for the project. General Contractors are the DANIEL CONSTRUCTION COMPANY of Greenville, South Carolina and Birmingham, Alabama.

Bakelite—West Virginia

BAKELITE COMPANY, Division of Union Carbide & Carbon Corp., 260 Madison Ave., New York 16, N. Y., has announced that a new plant for expanded production of fluorothene resins—a plastic that resists heat up to 400 F and withstands fuming nitric acid—is under construction at SOUTH CHARLESTON, W. VA.

This continuous process plant, which is expected to be completed by the middle of 1953, will be operated by Carbide and Carbon Chemicals Company, also a Division of Union Carbide and Carbon Corporation. Bakelite Company will handle the sales of fluorothene resins.

B&W Atomic Power Division

THE BABCOCK & WILCOX COMPANY, has announced the establishment of an Atomic Power Division of the company. C. H. GAY, vice president and formerly head of the manufacturing department of the company's Boiler Division, has been placed in charge of the new division.

The Babcock & Wilcox Company has been active in nuclear work since 1943. The company is associated with DETROIT EDISON and DOW CHEMICAL companies in work of applying atomic power to the generation of electricity.

International Acetylene Association Holds Successful 53rd Annual Meeting — Atlanta

Southeastern plant engineers featured in technical sessions; Describe applications of oxy-acetylene processes in industry.

In recognition of the industrial growth in the Southeast, the INTERNATIONAL ACETYLENE ASSOCIATION held its 53rd Annual Meeting in ATLANTA, GEORGIA, April 13, 14 and 15th.

Three technical sessions — Oxy-Acetylene Flames in Maintenance, Chemical and Metallurgical Uses of Acetylene and Calcium Carbide, and Flames for Profit — were of special interest to Southeastern plant engineering and maintenance personnel in attendance.

In the opening session, DORSEY B. THOMAS, Welding instructor of the UNION BAG AND PAPER COMPANY, Savannah, Georgia, described many examples of the numerous time and moneysaving uses found for oxy-acetylene in maintenance work. He emphasized that the oxy-acetylene torch is one of the greatest timesaving tools ever perfected and without its availability the continued high standard of the company's maintenance operations would not be possible.

WALTER S. SCHAEFFER, Development and Welding Engineer, REPUBLIC STEEL COMPANY, Gadsden, Alabama, gave many excellent examples of how extremely valuable a tool the acetylene flame is in steel mill maintenance.

J. DEAN DAVIDSON, General Manager, DAVIDSON GRANITE COMPANY, Lithonia, Georgia, summarized three types of quarry maintenance operations: heavy heating with the oxy-acetylene flame, oxy-acetylene welding, and those jobs in which the oxygen cutting processes are involved.

Recent developments in machine cutting, powder processes, and applications of oxy-acetylene flame-hardening were discussed by technical engineering sales personnel of AIR REDUCTION COMPANY, LINDE AIR PRODUCTS COMPANY, and NATIONAL CYLINDER GAS COMPANY.

On the concluding afternoon of the meeting, members of the Association and guests visited CONSOLIDATED QUARRIES at Lithonia, Georgia, to see a demonstration of jet-piercing for drilling blast holes in granite. Jet-piercing is a new process in which oxygen and a fuel, such as kerosene, burn to produce a flame with a temperature over 4,000 F. This flame, at supersonic velocity, causes the rock to spall or chip off and produces holes for blasting.

WHO'S WHO IN THE I.A.S.

The *International Acetylene Association* is one of the oldest technical associations in the country, having been founded in 1898.

It represents the whole of the oxy-acetylene industry. Its purpose is to develop broader and more useful applications of calcium carbide, acetylene gas, and allied products, and to disseminate thoroughly dependable technical information on these developments.

W. A. Brown, Jr., President of the Liquid Carbonic Corporation, Chicago, Illinois is President of the Association. *H. F. Reinhard*, Secretary, maintains executive offices of the I.A.S. at 30 East 42nd St., New York City.

Modern Engineering Co. Pres. Honored by I.A.S. Convention

Arthur J. Fausek, president, Modern Engineering Company, St. Louis, Mo., was honored by the International Acetylene Association's Annual Meeting in Atlanta, Ga., for his many contributions to safety and efficiency in the design of oxy-acetylene equipment and acetylene cylinders.

At the opening session of the convention in Atlanta, the 1952 Morehead Medal of the International Acetylene Association was awarded to ARTHUR J. FAUSEK, President, Modern Engineering Company, St. Louis, Missouri, for his many contributions to safety and efficiency in the design of oxy-acetylene equipment and acetylene cylinders. He developed and patented many early improvements such as a non-backfiring torch, multi-seat and safety check regulators, acetylene generators, and cutting machines. He also pioneered standardization of hose coupling for the oxy-acetylene industry.

Chemstrand Names Gronemeyer

FRED G. GRONEMEYER has been named assistant manager of THE CHEMSTRAND CORPORATION nylon plant under construction near PENSACOLA, FLORIDA, to assist plant manager ROY G. HEMMINGHAUS.

Fred G. Gronemeyer

Mr. Gronemeyer has been associated with Chemstrand since May, 1951, and has been chief engineer of the nylon plant since its inception. The plant is scheduled to come into production in early 1954.

Combustion Engineering, Inc.

Stockholders of Combustion Engineering-Superheater, Inc., recently voted to shorten the company name to COMBUSTION ENGINEERING, INC.

At the same time the following officers were elected to new posts: JOSEPH V. SANTRY, president, was elected Chairman of the Board and will continue as Chief Executive Officer; SAMUEL G. ALLEN retired as Chairman of the Board but will continue as Chairman of the Executive Committee; MARTENS H. ISENBERG, executive vice president, was elected president; GEORGE D. ELLIS, vice president and controller, was appointed vice president in charge of finance, succeeding HAROLD H. BERRY who will continue as a director.

Myers Names Mel Brooking

C. M. "MEL" BROOKING, former chief industrial engineer for the Texas Division of the LETOURNEAU COMPANY, LONGVIEW, TEXAS, has been named chief manufacturing engineer for the F. E. MYERS & BRO. CO., Ashland, Ohio.

Brooking, who had been with LeTourneau for over six years, is author of numerous articles which have appeared in *Southern Power and Industry*.

ELLIOTT TWIN STRAINERS
give double-barreled protection

SIZES AND BASKET MESH TO SUIT THE NEED

Fourteen sizes—1" to 24". Basket perforations, 1/32" to ⅜". If finer mesh is desired, basket can be lined with wire cloth. You get the straining service you need with Twin Strainers.

There is practically never any need to shut down a Twin Strainer. It provides its own standby service, thrown into operation by the two-way valves which shut off the fouled chamber.

For over a generation, Twin Strainers have been standard equipment in many industries. Now redesigned with many maintenance-saving features. Get the facts —write for the Twin Strainer Bulletin.

A-317

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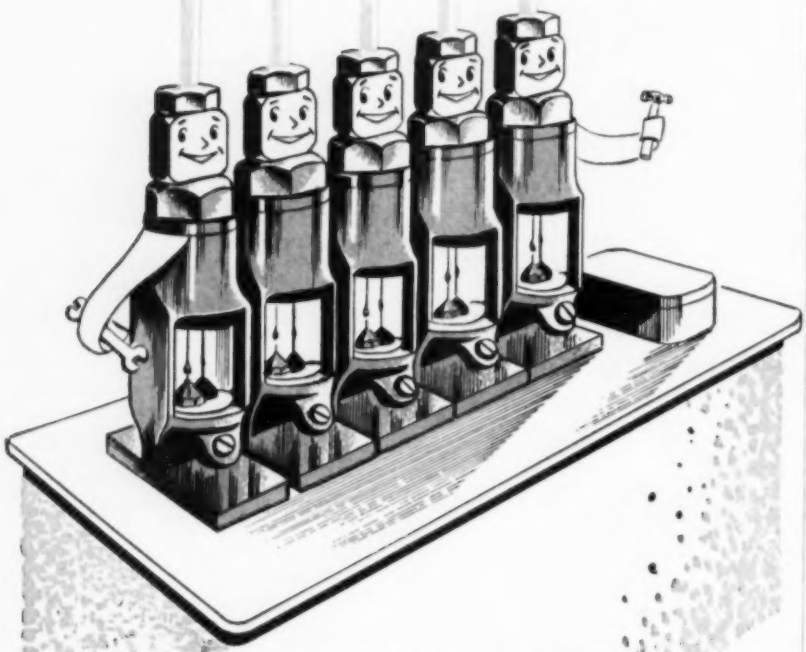
MECHANICAL
MAINTENANCE MEN

- SAVE LABOR
- REDUCE WEAR
- PREVENT BREAKDOWNS
- SLASH OIL CONSUMPTION
- ELIMINATE DOWNTIME



Automatic force feed lubrication by Manzel provides a sure way to *lengthen* the life of machinery and reduce operating costs. Manzel Lubricators unfailingly supply *exactly* the amount of oil needed at each wearing point *and no more.* They are furnished as standard equipment on leading makes of engines and machinery, or they can be installed on your present equipment. Write now for full information.

Manzel

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news (continued)

George Dockray Joins SP&I Editorial Staff

GEORGE H. DOCKRAY has joined the editorial staff of SOUTHERN POWER & INDUSTRY as regional editor with headquarters in the Carolinas.

George H. Dockray

George was born in Philadelphia, went to elementary school in Bennington, Vt., and graduated from the Philadelphia Textile Institute. He is a member of ASME and Delta Kappa Phi Fraternity. He has had experience in many phases of industrial production as a result of years spent in various plants. He spent a year as an instructor at his Alma Mater and some time in research work at Temple University in Philadelphia. Prior to joining SOUTHERN POWER & INDUSTRY, he was in the technical department of the National Cotton Council, specializing in mechanical processing research.

During the war, the 8th Air Force utilized his services in England and he still holds a reserve commission. Uncle Sam lets him deduct for his wife, a girl of ten, and a boy of one. When things settle down at home, he likes to listen to Beethoven.

Reynolds Expands Ky. Plant

REYNOLDS METALS COMPANY'S Plant 9 in LOUISVILLE, KENTUCKY, for the past few years an operation engaged in making aluminum foil from coil metal processed outside the state, will be altered to enable the plant to handle all steps in the production of aluminum foil.

The expansion will cost an estimated $2,553,000. The project will be started as soon as plans are completed. The alteration program calls for modernization of the cast house where pig aluminum is melted and cast into billets suitable for rolling. New ovens, and new "hot lines" for rolling the metal to thinner gauges will be installed.

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DECATUR Decatur Electric Service Co.
FLORENCE Fortney Electric Co.
MOBILE Russell Electric Company, Inc.
MONTGOMERY Standard Electric Co.
TUSCALOOSA Eddie's Elec. Motor Service

ARIZONA
LOWELL Copper Electric Company, Inc.
PHOENIX Daley Electric Company
PHOENIX Motor Rewinders
SAFFORD Valley Electric & Machine Co.
TUCSON Pima Electric Company

ARKANSAS
FORT SMITH [illegible] Service Company
LITTLE ROCK [illegible] Electric Company
PINE BLUFF [illegible] Equip. Service Co.

CALIFORNIA
BAKERSFIELD Elec. Motor Sales & Serv.
BLYTHE Jack D. Dance Electric
BRAWLEY Doyle Electric Company
CORNING Neuhardt Electric
FRESNO Blackstone Electric Motor Shop
GRASS VALLEY Sierra Elec. Motor Serv.
LOS ANGELES Gory Electric Service
LOS ANGELES Larsen-Hogue Elec. Co.
MARYSVILLE Kinney Electric
MODESTO Industrial Electric Company
OAKLAND T. L. Rosenberg Company
OCEANSIDE The Electric Motor Service
PASADENA Pompey Elec. Motor Service
POMONA Pomona Elec. Mach. Co., Inc.
RED BLUFF Red Bluff Industrial Elec.
RIVERSIDE Backstrand Brothers
SACRAMENTO Williams Electric Service
SALINAS Quality Electric Company
SAN DIEGO Bay City Electric
SAN JOSE Kurze Electrical Works
SANTA CRUZ Coast Electric Motor Service
SANTA ROSA Leete Electric Motor
STOCKTON Stanley Electric Motor Co.
VENTURA [illegible]field Electric Company
WATSONVILLE [illegible] & H Elec. Motor Works
WILMINGTON [illegible] & Galvan
WOODLAND Industrial Motor Electric

COLORADO
DENVER Tree Electric Service
DENVER Weaver Electric Co.
FORT COLLINS Al Pennock Electric Motor Service

CONNECTICUT
BRIDGEPORT Electric Motor Sales & Service
NEW BRITAIN Monarch Electric Co.
NEW HAVEN G. E. Wheeler Company

DELAWARE
WILMINGTON McHugh Electric Company

DISTRICT OF COLUMBIA
WASHINGTON, D. C. Carty Electric & Armature Service, Inc.

FLORIDA
MIAMI Peninsular Armature Works
PANAMA CITY West Florida Elec. Service

GEORGIA
ATLANTA Cleveland Electric Company
MACON Electric Repairs, Inc.
SAVANNAH Electric Motor Service Co.

IDAHO
BOISE L & K Electric Motor Co.
LEWISTON E. D. Smith & Son
POCATELLO C-L Electric Company

ILLINOIS
AURORA Connell Manufacturing & Electric
CHICAGO Excel Electric Service Company
CHICAGO Lehman Electric Company
CHICAGO Sievert Electric Company
DECATUR Industrial Electric Shop
EAST ST. LOUIS Illinois Elec. Works, Inc.
LA SALLE Monarch Electric & Supply Co.
MARION Giles Armature & Elec. Works, Inc
PEORIA Hendricks Electric Company
QUINCY Electric Motor Repair Co.
ROCKFORD Rockford Industries, Inc.
ROCK ISLAND Torrance Elec. Co., Inc.

INDIANA
EVANSVILLE Flanders Elec. Motor Serv.
FORT WAYNE V. M. Nussbaum & Company
INDIANAPOLIS Moran Elec. Serv. Co.

IOWA
CEDAR RAPIDS Electric Motors Co., Inc.
DAVENPORT Industrial Engineering & Equip. Co.
DES MOINES Electric Equip. Co., Inc.
DUBUQUE Dubuque Electric Motor Serv.
MARSHALLTOWN Egleston Electric Co.
MASON CITY Zach Bros. Electric
SPENCER Pixler Electric Co.

KANSAS
GARDEN CITY [illegible] Electric Shop
GREAT BEND Johnson Electric Co., Inc.
HUTCHINSON Hilton Electric Company
SALINA Mid-States Armature Works, Inc.

KENTUCKY
LOUISVILLE Krauth-Campbell Electric Company, Inc.
MADISONVILLE Whitfield Electric Co.

LOUISIANA
ALEXANDRIA Alexandria Armature Co.
LAFAYETTE Hub Armature Works
LAKE CHARLES Gulf Armature Company
MONROE Poulan's Electrical Company
NEW ORLEANS New Orleans Armature Works
SHREVEPORT Shreveport Armature & Elec. Works

MAINE
BREUER Leen's Electric Motor Service

MARYLAND
BALTIMORE Keystone Electric Co., Inc.
HAGERSTOWN Hagerstown Equip. Co., Inc.

MASSACHUSETTS
BOSTON Sandman Electric Co., Inc.
BOSTON Skillings Electric Company
PITTSFIELD Elec. Supply & Repair Co., Inc.
SPRINGFIELD Superior Electric Co., Inc.
WORCESTER Alfred L. Brown Assoc., Inc.

MICHIGAN
BATTLE CREEK Electric Motor Company
DETROIT Michigan Electric Motors Co.
DETROIT Miller-Seldon Electric Company
KALAMAZOO Kalamazoo Elec. Motor Serv.
LANSING F. [illegible] Hayes Co.
MUSKEGON Whittaker Electric Company
PONTIAC Hodge-[illegible] Motor Company
PORT HURON Fi[illegible]ugh Electric Co.
SAGINAW Lange and Leamar Elec. Co.

MINNESOTA
MINNEAPOLIS Boustead Elec. & Mfg. Co.
ST. PAUL Commonwealth Electric Co.

MISSISSIPPI
JACKSON Power Electric Company

MISSOURI
JEFFERSON CITY Linsenbardt Electric Co.
KANSAS CITY Independent Electric Machinery Company
KANSAS CITY Kornfeld-Thorp Elec. Co.
SPRINGFIELD Springfield Elec. Serv. Co.
ST. LOUIS Carl I. Schaeffer Elec. Co.
ST. LOUIS Interstate Electric Co., Inc.

MONTANA
MISSOULA Industrial Electric Co.

NEBRASKA
BEATRICE Sprague Electric Service, Inc.
COLUMBUS Overturf Electric Motors
GRAND ISLAND Motor Engineering Works
KEARNEY Industrial Electric Service
LINCOLN Colin Electric Motor Serv. Co.
OMAHA Omaha Electrical Works

NEW HAMPSHIRE
MANCHESTER Cohen Machinery Co., Inc.

NEW JERSEY
EAST RUTHERFORD Standard Electric Motor Repair
FREEHOLD Blain Electric Motor Shop
LINDEN Standard Elec. Motor Repair Co.
PATERSON Lyons Electric Company, Inc.
SOMERVILLE Electric Motor Service
[illegible] Electrical Motor Repair Co.
WOODBURY Electric Motor Repair Co.

NEW MEXICO
ALBUQUERQUE Powell [illegible] Corp.
CARLSBAD E. D. Saunders Elec. Co.

NEW YORK
AUBURN Auburn Armature Company
BATAVIA Secord Electric Shop
BUFFALO Lang Electric Co., Inc.
JAMESTOWN Elec. Motors Service Co.
NEW YORK Premier Elec. Eng. Co.
ROCHESTER O. G. Schwab Company
STATEN ISLAND Jedco Electrical Corp.
SYRACUSE Murray Electric Company
UTICA Mather Evans & Diehl Co., Inc.

NORTH CAROLINA
CHARLOTTE Jones Electric Repair Co.
CHARLOTTE Southern Elec. Service Co.
GREENSBORO Southern Elec. Ser. Co.
RALEIGH Elec. Motor & Repair Co.
ROCKY MOUNT Hammond Electric Co.

OHIO
CHILLICOTHE Duffy Electric Company
CINCINNATI Barkley Electric Company
CINCINNATI The Sullivan Elec. Co.
CLEVELAND Center Elec. Service Co.
LIMA Lima Armature Works, Inc.
MANSFIELD Phoenix Electric Co.
MARION Marion Elec. Motor Service, Inc.
NEW PHILADELPHIA Fenton Bros. Electric
SPRINGFIELD The B & M Electric Co.
TOLEDO Romanoff Elec. Motor Service
ZANESVILLE Reliable Elec. [illegible] Co.

OKLAHOMA
[illegible] [illegible] Electric Company
MUSKOGEE Gene[illegible] Electric Company
NOWATA Gordon Machine & Electric Co.
OKLAHOMA CITY Southwest Electric Co., Inc.
TULSA Bartlett Electric Co.

OREGON
EUGENE Kalen Elec. & Machine Co.
KLAMATH FALLS Ray Bigger Elec. Equip.
NEWBERG Gibbs Electric Company
PORTLAND Reed Electric Company
ROSEBURG Ridenour Electric Company
SALEM Walton Brown Electric Company

PENNSYLVANIA
ALLENTOWN H. N. Crowder, Jr., Company
ALTOONA H. D. Force Co.
EASTON Stokes Engineering & Supply Co.
ERIE Erie Electric & Machine Co.
LANCASTER Fidelity Electric Company
NORRISTOWN Coleman & Schmidt
PHILADELPHIA Atlantic Elec. Motors Co.
PHILADELPHIA J. J. Smith Elec. Motor Co.
PITTSBURGH Electric Mfg. & Repair Co.
POTTSTOWN Mellon Engr. Co.
READING Standard Elec. Service Corp.
WILLIAMSPORT G. I. Electric Company

RHODE ISLAND
PAWTUCKET New England Machine & Electric Company
PROVIDENCE Walco Elec. Products Co.

SOUTH CAROLINA
GREENVILLE Southern Elec. Service Co.
SPARTANBURG Southern [illegible] Service Co.

TENNESSEE
KNOXVILLE Tennessee Armature & Electric Company
MEMPHIS Frank Stephens Electric Co.
NASHVILLE Electrical Machinery & Supply Co.

TEXAS
BEAUMONT Elec. Machinery & Repair Co.
CISCO Dalton Electric Co.
CORPUS CHRISTI Bradleys' Motor & Armature Works
FORT WORTH Warrington Electric Shop
HOUSTON Roy A. Brentz Company, Inc.
HOUSTON Texas Armature Works
LUBBOCK Lubbock Electric Company
LUFKIN Elec. Machinery & Repair Co.
McALLEN [illegible] Armature Works
SAN ANTONIO Electric Motor Service & Sales Co.

UTAH
SALT LAKE CITY Schraga Electric Co.

VERMONT
BARRE Cushman Electric Co.

VIRGINIA
NORFOLK Virginia-Carolina Electrical Works, Inc.
RICHMOND Elec. Motor & Repair Co.
ROANOKE Lloyd Electric Company
STAUNTON Johnson Electric Company

WASHINGTON
ABERDEEN Industrial Elec. Service Co.
EPHRATA Gardner Electric
LONGVIEW Longview Electric
MOUNT VERNON Mount Vernon Electric Motor Service
OKANOGAN H. H. Hall Motor Shop
SEATTLE Seattle Electric Works
SPOKANE Tinling & Powell
WALLA WALLA Berry Electric Company
WENATCHEE Pacific Electric Service
YAKIMA Copper Elec. Motor Service Co.

WEST VIRGINIA
CHARLESTON Charleston Elec. Sup. Co.
CLARKSBURG Barnes & Brass Electric Co.
WHEELING Whitney Electric Co.

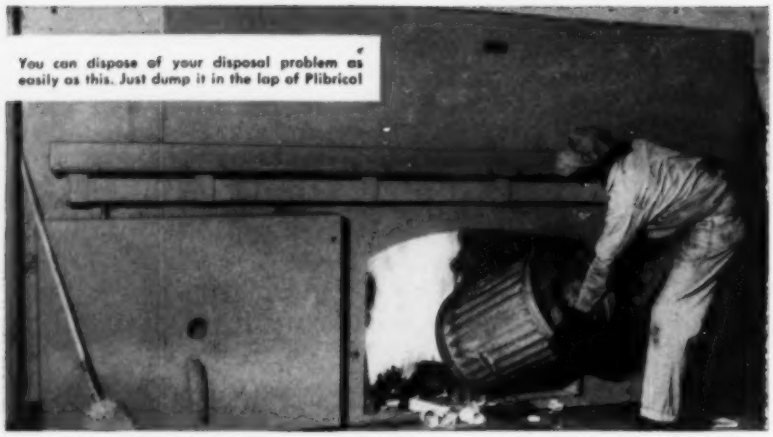
WISCONSIN
APPLETON Kurz Electric Service Co.
GREEN BAY Beemster Electric Company
KENOSHA Hammes Electric Motors Co.
MILWAUKEE Elec. Sales & Engr. Co.

WYOMING
CASPER Electric Service Co.

STERLING ELECTRIC MOTORS

Plants: New York City 51 • Los Angeles 22 • Hamilton, Ontario, Canada • Santiago, Chile

Offices and distributors in all principal cities



Clean-cut way to solve a dirty problem

The Plibrico way is the efficient way, the recognized way, the long-lived economical way to wipe out that rubbish burning problem. Your own, clean-burning efficient Plibrico Incinerator calls a final halt to the fire hazard and smoke nuisance of open fires . . . or the mess and inefficiency of attempting to burn rubbish in the boiler furnace . . . or the excessive cost of hauling rubbish away and the unsanitary accumulation of rubbish between haulings.

The broad Plibrico Incinerator line has grown out of Plibrico experience as the nation's largest manufacturer of refractory specialties. There is a type and kind for every need — from smallest to largest and for every kind of refuse. The Plibrico steel-cased Standard Rubbish Destructor illustrated is typical of incinerators that are being used in hundreds of plants to dispose of general industrial refuse.

This incinerator is engineered for the rapid burning action of readily combustible material. Direct gas flow and adequate stack area avoid the danger of smoke and flame belching back from fire doors. A deflecting arch behind the bridge wall provides the long flame travel essential to smokeless combustion.

COMPLETE ERECTION SERVICE

This Plibrico Rubbish Destructor is available in four standard sizes to meet practically all plant requirements. You can have a Plibrico Incinerator erected by your local Plibrico Sales & Service distributor. Ready-to-operate portable incinerators are available for smaller requirements.

PLIBRICO *Rubbish* DESTRUCTOR

Plibrico Company

1838 Kingsbury St., Chicago 14, Ill.

PLIBRICO SALES & SERVICE IN PRINCIPAL CITIES

REFRACTORY PRODUCTS • ENGINEERING • CONSTRUCTION

news (continued)

Safety Seal, Ft. Worth Elects Weldon Baker Pres.

WELDON BAKER has been elected president of SAFETY SEAL PISTON RING CO., FORT WORTH, TEXAS.

Weldon Baker

The company was incorporated in January of 1953 and has purchased new plant facilities to increase production of its complete line of industrial and marine piston rings, including a new one-piece sealing ring on which patents are pending. The new factory and offices are located at 1111 Foch Street in Fort Worth.

Buchanan—Fort Worth

BUCHANAN ELECTRICAL PRODUCTS CORPORATION, Hillside, New Jersey has announced establishment of sales representative's office in FORT WORTH, TEXAS in charge of J. E. (BILL) MORTON, who has for several years been associated with the Cummins Supply Company of Fort Worth and Abilene in warehouse and counter sales and more recently as Quotation and Estimate Clerk.

J. E. "Bill" Morton

Mr. Morton will be associated with Walter Clinton of Houston and Hartwell Jalonick of Dallas, who have for several years been handling the Buchanan line in Texas, Oklahoma, Arkansas, Louisiana, Mississippi and western Tennessee.

Barber-Colman Co.—S. C.

THE BARBER-COLMAN COMPANY of Rockford, Illinois, announces the opening of a new factory branch office in COLUMBIA, SOUTH CAROLINA.

The new office, located at 537 Harden Street, will handle the sale of Automatic Control and Air Distribution Products. MR. ROBERT LINDSAY is the branch manager.

Federal Electric Expands

FEDERAL ELECTRIC PRODUCTS COMPANY, 50 Paris St., Newark, N. J., makers of industrial switches, circuit-breakers, control boards, and related equipment, have announced reorganization of their administrative structure in line with current expansion.

Five self-contained divisions are being set up. Each division will now be responsible primarily for the manufacture of a single product line. Headquarters of the Panelboard Division will be the ST. LOUIS plant. Plants in ST. LOUIS, CLEVELAND, DALLAS, and LONG ISLAND CITY will manufacture these items.

Eggelhof Engineers— Little Rock and Houston

HARPER M. YOUNG, JR. has been appointed sales engineer in charge of the EGGELHOF ENGINEERS sales office in LITTLE ROCK, ARK.

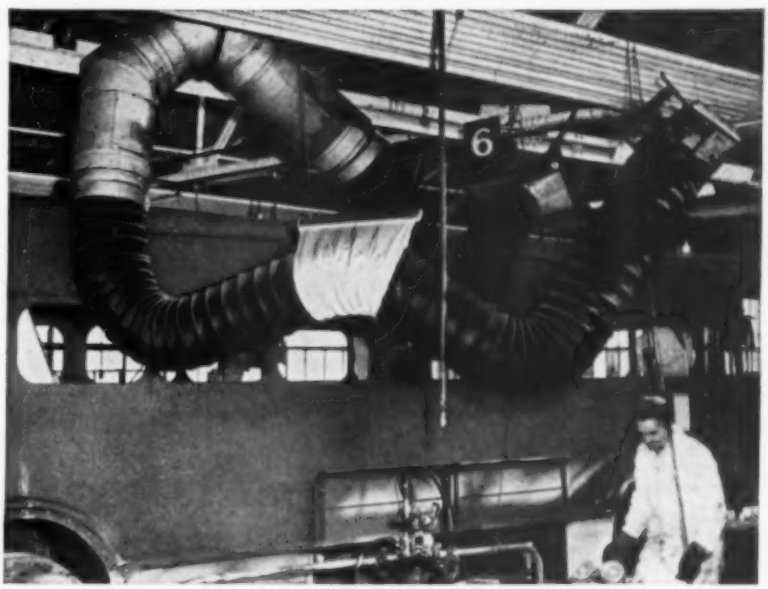
Before joining Eggelhof Mr. Young was machinist foreman for Delta Shipbuilding Co. in New Orleans for two years and sales engineer for Armco Drainage & Metal Products, Inc. in Houston for three years.

Harper M. Young, Jr. (left), and Bob Thomas now with Eggelhof Engineers.

ROBERT GEORGE THOMAS has joined the engineering staff of Eggelhof in HOUSTON.

Mr. Thomas is a graduate of Rice Institute where he received his mechanical engineering degree in 1949. Prior to joining Eggelhof he was an estimator and field engineer for W. S. Bellows Construction Corp. and estimator for A. O. Smith Corp.

IF YOUR DUCTING SYSTEM HAS "THE BENDS" call in the top specialist— SPIRATUBE®



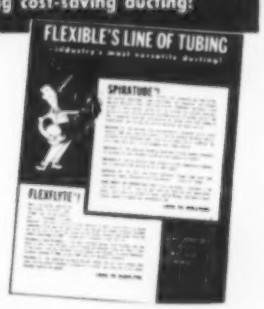
Look at the bulky, unadaptable and costly rigid ducting to which versatile SPIRATUBE has been attached in the above application. If your dust and fume removal... air handling of any kind... requires ducting that will take 'the bends' anywhere and often, ducting that can follow work around, you should know about inexpensive SPIRATUBE. It's easily, quickly installed... offers MINIMUM WEIGHT – MAXIMUM FLEXIBILITY.

Standard sizes with various fabrics and coatings for all requirements are immediately available from well-stocked distributors – coast-to-coast!

Write today for full details on Flexible's amazing cost-saving ducting!

Flexible Tubing CORPORATION

Guilford, Connecticut Pasadena 1, California



CYCLOTHERM* CYCLONIC COMBUSTION PRODUCES MORE STEAM... IN LESS SPACE... AT LOWER COST!

- In multiple installations or as a single unit, a Cyclotherm steam generator is your assurance of quick, dependable steam—plus greater all-round economy.
- You get more power . . . Cyclotherm Cyclonic Combustion flame control required just 3 sq. ft. of heating space per Boiler Horsepower. This means your Cyclotherm delivers 66⅔% *more* steam generating power per sq. ft. than ordinary steam generators of comparable size.
- Cyclotherm steam generators can be conveniently located in any building where steam is required. With only 3 sq. ft. per Boiler Horsepower your Cyclotherm saves up to ⅓ the space of conventional steam generators. Installation is easier because each Cyclotherm arrives complete . . . connect fuel, electricity, water and a simple flue and it's ready to generate steam. Controls are fully automatic.
- A guaranteed *minimum* efficiency of 80% saves on fuel—gas, oil or combination—and lowers maintenance costs. Cyclotherm gives you full power from a cold start in 15 to 20 minutes. In multiple installations, an automatic battery control panel distributes the load for maximum operating economy.
- Cyclotherm steam generators are designed for 18 to 500 h.p., 15 to 200 psi operating pressures. Approved —ASME, National Board Standard, and Underwriters Laboratories, Inc.

*Reg. trade name

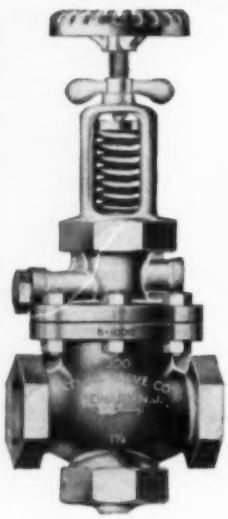
Find out how Cyclotherm Cyclonic Combustion will fill your steam requirements. Write for a free illustrated folder. Dept. 34

CYCLOTHERM* STEAM GENERATORS

STELLITED

ATLAS

Steam Reducing Valves Type "B"



In our 52-page bulletin 1-A ten pages are devoted to ATLAS Type "B" Reducing Valves. Fig. 112, shown here, is a bronze body reducing valve for 300 pounds steam service. For reduced working pressures from 10 lb. to within 20 pounds of the initial pressure in one stage.

Fig. 114 has an iron body. For initial working pressures from 20 to 250 lb. saturated steam. Reduced: same as Fig. 112.

Fig. 112 (LP) is similar in most ways to Fig. 112 but handles reduced working pressures of ½ to 15 lb.

Fig. 114 (LP) has an iron body. Similar to Fig. 114 but handles reduced working pressures of ½ to 15 lb.

Then come the steel bodies—right from Series 15 to Series 90, for all the way up to 900 lb. pressure with 900° F temperature. Some of them handle reduced working pressures from 10 lb. to within 30 pounds of the initial pressure in one stage and the others handle reduced working pressures from ½ lb. to 15 lb.

ALL ARE STELLITED

The pilot valves are solid Stellite. The pilot valve seats are Stellite faced. In the steel body valves the main valve seat is solid Stellite. Stellite assures long life because it is practically immune to severe abrasion and corrosion.

Type "B" valves are recommended for reducing the pressure of steam where the service demands a tight seating valve and a uniform reduced pressure. Simple to maintain. Main valve and pilot valve are easily removed for cleaning. Entire pilot valve can be lifted out without difficulty.

To get the whole story—cross sectional views—details as to parts — etc. — together with information concerning other ATLAS Reducing Vaives for steam, water, air, gas, or oil:-

Ask for Bulletin No. 1-A

ATLAS VALVE COMPANY

REGULATING VALVES FOR EVERY SERVICE

275 South St. Newark 5, N. J.

Represented in Principal Cities of the South

Campbell Boiler Feed Regulator
Temperature Regulators
Reducing Valves
Exhaust Control System
Pressure Regulators
Pump Governors
Damper Regulators
Back Pressure Valves
Balanced Valves
Control Valves
Float Valves

LADISH *Controlled Quality* ASSURES METALLURGICAL SOUNDNESS

SPECTROGRAPHIC ANALYSIS
One of many comprehensive Ladish laboratory test procedures for assuring reliable performance.

TO MARK PROGRESS

Ladish measures the spectrum to verify chemical composition

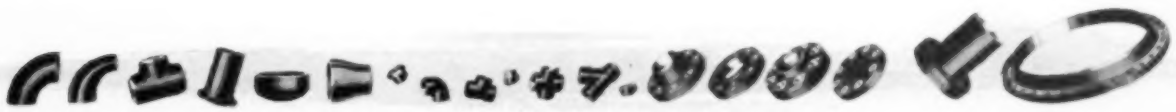
Metallurgical integrity—is safeguarded at Ladish by unsurpassed laboratory controls. Typical is this advanced electronic direct-reading spectrograph. On this unit as many as 300 determinations have been made in one hour to verify compliance of each mill heat with exacting Ladish specifications and, equally important, to assure the absence of detrimental "tramp" elements. Here is but one indication of the thorough, scientific procedures that assure reliability in every Ladish Controlled Quality fitting.

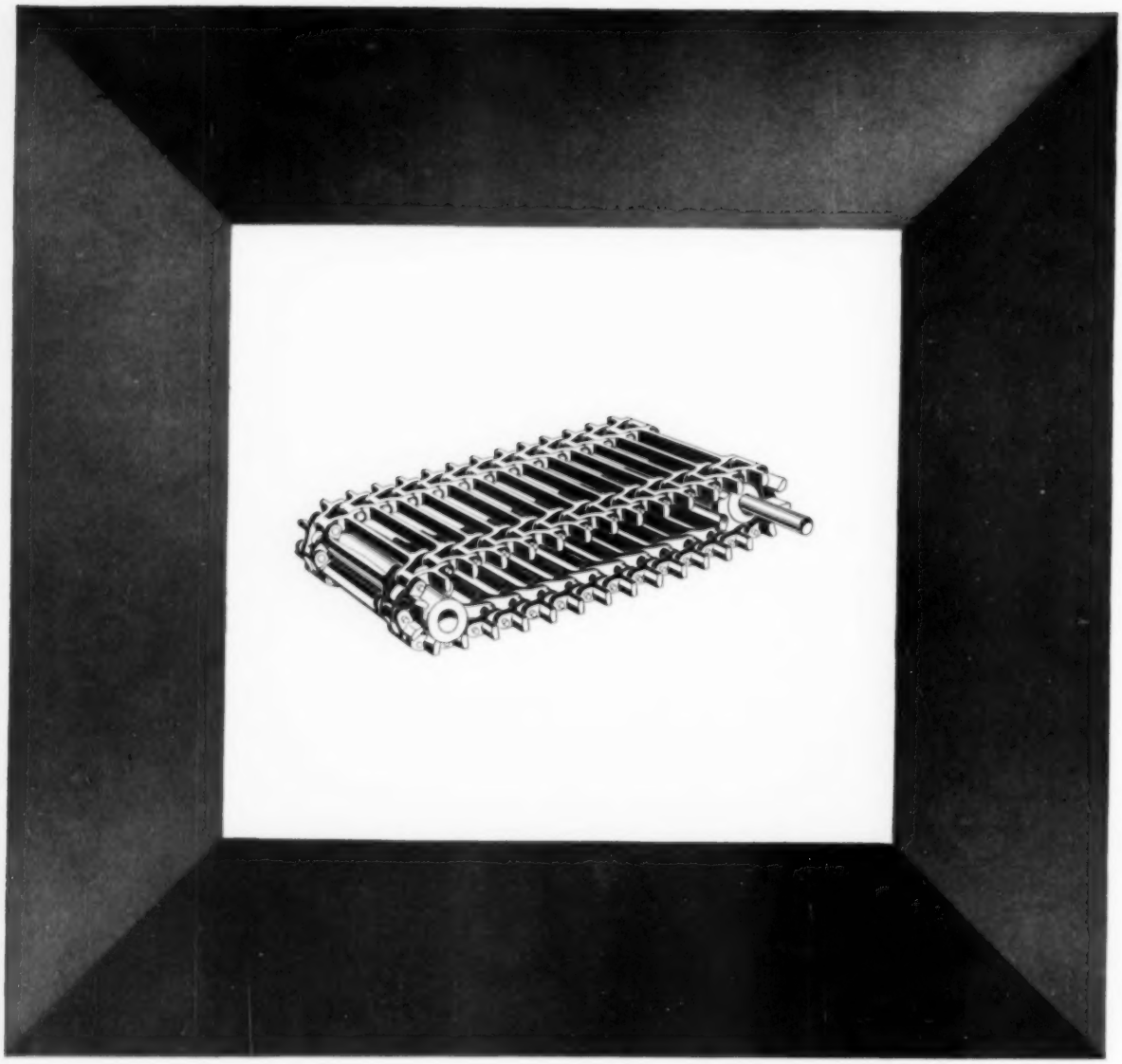
THE COMPLETE *Controlled Quality* FITTINGS LINE
PRODUCED UNDER ONE ROOF . . . ONE RESPONSIBILITY

LADISH CO.

CUDAHY, WISCONSIN
MILWAUKEE SUBURB

District Offices: New York • Buffalo • Pittsburgh • Philadelphia • Cleveland • Chicago • St. Paul
St. Louis • Atlanta • Houston • Tulsa • Los Angeles • San Francisco • Havana • Mexico City • Brantford, Ont.





The secret of no-clog feed for Perfect Spread

PERFECT SPREAD is the only STOKER available today that never clogs... not even on wet coal! And the secret of this remarkable efficiency is the exclusive American Engineering traveling conveyor feeder, pictured above, which employs a high traction principle and assures true, *continuous* feeding throughout its operating range of 50 to 7500 lbs. of coal per hour.

But in addition to no-clog feed, Perfect Spread Stoker gives you every other important feature... the special high-capacity spiral overthrow rotor which spreads coal over the whole grate so perfectly that it furnishes the stoker's name... the engineered cinder return and overfire air system that yield comparable results with both low and high ash coals.

Perfect Spread Stokers are made in a wide choice of sizes, capacities and grate types. Whether you are considering a new unit or restokering an old one, talk things over with your AE representative. It may lead to most steam at least cost.

AE

AMERICAN ENGINEERING

COMPANY

2421 ARAMINGO AVE., PHILADELPHIA 25, PA.

IN CANADA: AFFILIATED ENGINEERING CORPORATIONS, LTD., MONTREAL 2, CANADA

AE Products are: Taylor and Perfect Spread Stokers, Marine Deck Auxiliaries, Hele-Shaw and Hydramite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers.

Rectorseal—Southeast

LLOYD R. HALLBERG has been appointed factory representative in the Southeastern States for Rectorseal, according to an announcement by Rectorseal Division of the RECTOR WELL EQUIPMENT COMPANY, INC.

Lloyd R. Hallberg

Mr. Hallberg, widely experienced in sales and promotion work, will devote his major activities to the introduction and promotion of the use of Rectorseal No. 2 thread and gasket sealant in the LP Gas and Natural Gas market, as well as general industry. He will work directly from the HOUSTON, TEXAS office.

Dumas Steel—Georgia

THE DUMAS STEEL CORPORATION, Pittsburgh, Pa., has opened a new warehouse at Marietta, Georgia, in the McNeal Building on Sessions Street.

Operations at the new warehouse will consist of processing and marketing steel products. Hot rolled and cold rolled sheets, galvanized sheets, and tin mill products will comprise the initial stock with hot and cold rolled strip, hot rolled bars, bar shapes, light structurals, steel plate, and floor plate to be added as soon as conditions permit.

The warehouse will serve principally small manufacturers in seven Southeastern states including Alabama, Florida, Georgia, Tennessee, North and South Carolina and Mississippi. J. W. Clouser is manager.

Appleton Names Bell, Texas

APPLETON ELECTRIC COMPANY has announced the appointment of JOHN O. BELL, JR., as district sales manager for the entire State of TEXAS, with headquarters in Houston.

Mr. Bell is a graduate of the University of Houston. He has been ac-

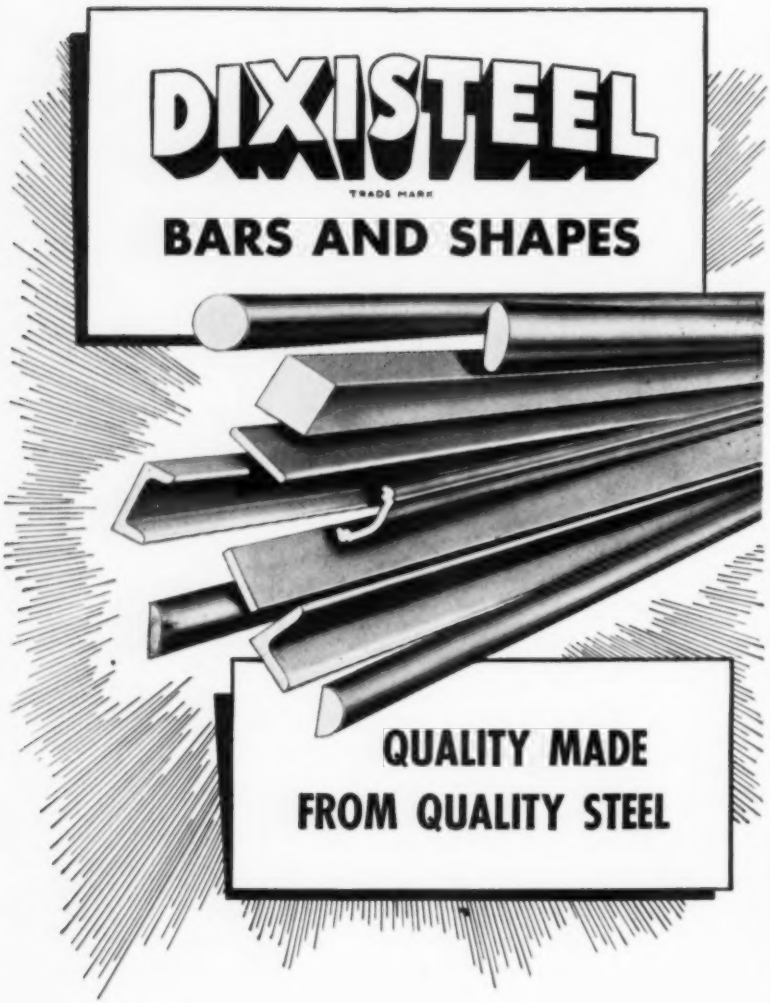
THE highly accurate EYE-HYE manometric gage has supplied reliable boiler water level indication on panel boards or other remote locations for more than 15 years. Now you can have auxiliary light signals or audible alarms anywhere in your plant, dependably operated by an electronic hook-up with the EYE-HYE.

Probes extending into the window unit and the calibrating tube complete an electrical circuit at the level of the indicating fluid. The signals or alarms coincide exactly with the reading in the always-accurate EYE-HYE. This new facility, added to the popular EYE-HYE, in no way interferes with the reliable operation of the remote gage.

With a two-light Levalarm Light Indicator, the red light warns of dangerously high or low water levels, the green light indicating a safe level. Vibratory electric horns or bells can be used in addition or instead of light signal.

Increase the safety of your water level control. Write for more information on the EYE-HYE with auxiliary alarms.

THE RELIANCE GAUGE COLUMN COMPANY • 5902 Carnegie Avenue • Cleveland 3, Ohio



DIXISTEEL merchant bars are quality-controlled from start to finish. At each step of production — from molten steel to the finished hot-rolled product — checks and rechecks are made to assure proper physical properties, finish and tolerances.

DIXISTEEL Bars and Shapes are produced in a wide variety of shapes, sizes and grades — plain or galvanized.

Write today for complete information and prices.

Atlantic Steel Company
ATLANTA, GEORGIA

Producers of fine-quality low-carbon steel products, including: hot rolled bars, shapes and strip • drawn wire • nails, rivets, staples • fence and barbed wire • fabricated reinforcing bars • forgings and stampings

tively associated with the electrical industry for eight years and for the past five years he has been with Appleton as a sales engineer in the Southeast Texas territory.

Atlantic Steel President Honored in Pennsylvania

ROBERT S. LYNCH, president of the ATLANTIC STEEL COMPANY, ATLANTA, GEORGIA, was honored at the recent annual meeting of the Kiski Valley Enterprises and the Vandergrift Chamber of Commerce, Vandergrift, Pennsylvania, with the Kiski Valley annual award in recognition of personal accomplishments and contributions to the American steel industry.

Milton E. Uncapher, Jr., a director of the Vandergrift Chamber of Commerce, presented a bronze plaque to Mr. Lynch on which was inscribed:

"To Robert Scott Lynch, a native of Kiski Valley, who has risen to a position of the greatest importance in the American Steel Industry and in the Industrial Field of business. This plaque is awarded as a token of the pride taken in his achievements by the neighbors of his youth at 1953 Industrial Appreciation Banquet by Kiski Valley Enterprises, Inc., and Vandergrift Chamber of Commerce."

More than 500 business and industrial men from all parts of the Kiski Valley attended the annual Industrial Appreciation dinner at which Mr. Lynch was honored. The affair was the largest ever held in Vandergrift and marked the launching of the Kiski Valley Enterprises, Inc., recently organized to interest new industries to locate in that area.

Mr. Lynch was born in Vandergrift, Pennsylvania, and lived there during his early life. In 1920 he began work as a laborer in the open hearth of the Vandergrift plant of the Carnegie-Illinois Steel Corporation, then known as the American Sheet and Tin Plate Company. He later became first helper and in 1924 moved to Canton, Ohio. Here he worked on the blast furnace operations of the United Alloy Corporation and subsequently operated electric melting furnaces as first helper.

Advancements then followed to assistant superintendent, superintendent, and general superintendent of operations of the Alloy and Stainless Steel Division of Republic Steel Corporation's Massillon, Ohio, plant. He moved to Atlanta, Georgia, in 1944, as general superintendent of the Atlantic Steel Company. In 1946 he was made vice-president in charge of operations and in January, 1947, he was elected president, which position he still holds.

Electrical Q & A

(*Starts on page* 78)

(2) Reactor-start motor.

A reactor-start motor is a form of split phase motor which has a reactor connected in series with the main winding during the starting period. After the motor has attained the predetermined speed the reactor is shorted out of the circuit and the auxiliary winding is opened.

(3) Capacitor-start motor.

A capacitor-start motor is a form of split phase motor having a capacitor or condenser connected in series with the auxiliary winding. The auxiliary winding is opened when the motor has attained the predetermined speed.

(4) Capacitor motor.

A capacitor motor is a single phase induction motor with the main winding connected directly to the power circuit and the auxiliary winding connected in series with a capacitor. The capacitor and auxiliary winding is left in the circuit while the motor is in operation.

Q—What is the single phase series motor and what are its features and uses?

A—The alternating current series motor is built like and has the same general characteristics as the direct current series motor. It has a commutator and brushes on its armature which are in series with its field circuit. It is a varying speed machine with low speeds for large loads and high speeds for small loads. Its starting torque is high. The motor requires special design to minimize sparking and heating and to improve its power factor.

Special types of the series motor are built with compensating windings for these purposes, especially in the larger sizes. Small series motors are much used for driving fans, vacuum cleaners and other appliances. Large sizes are used for alternating current railway work and to a moderate extent for cranes and hoists. On account of the higher efficiency and better commutation of the direct current series motor, the alternating cur-

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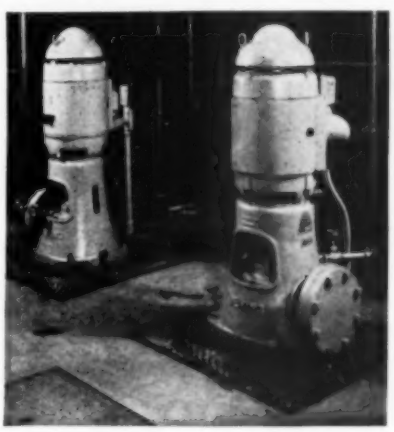
Here's another example of the versatility of Deming Vertical Turbine Pumps. Designed originally for deep well pumping, the efficiency and adaptability of these pumps has extended their application to a diversity of liquid handling services.



The two Deming Turbine Pumps illustrated are part of the air conditioning system at the United Nations Building in New York City. Salt river water from the East River flows through conduits to the third basement level and is pumped through rotating drum type screens to free it of foreign matter before use in the air conditioning systems. The Deming Pumps wash the rotating screens to prevent them from clogging.

The installation was made by Kerby Saunders, Inc. Each unit pumps 200 gallons per minute against a 35 foot head. Pumps are powered by 5 H.P. motors.

Deming Vertical Turbine Pumps are available in a full range of capacities up to 3500 G.P.H.

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This illustrated bulletin gives essential facts about Deming Vertical Turbine Pumps.

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For want of a seal
a machine was lost.
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an order was lost.
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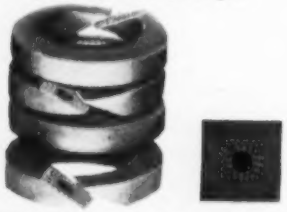

BELMONT 19 . . . for hot and cold water rods and plungers; low and intermediate steam rods.

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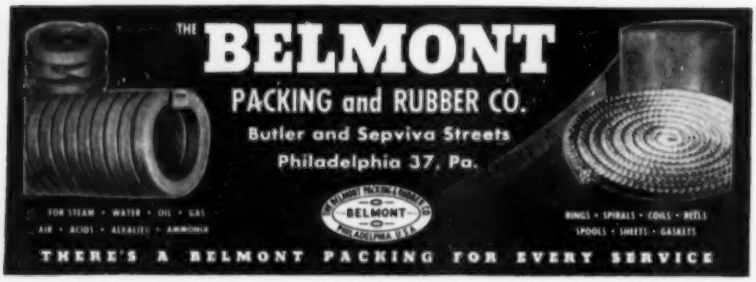


rent series type is not used as much for railway work as in former years.

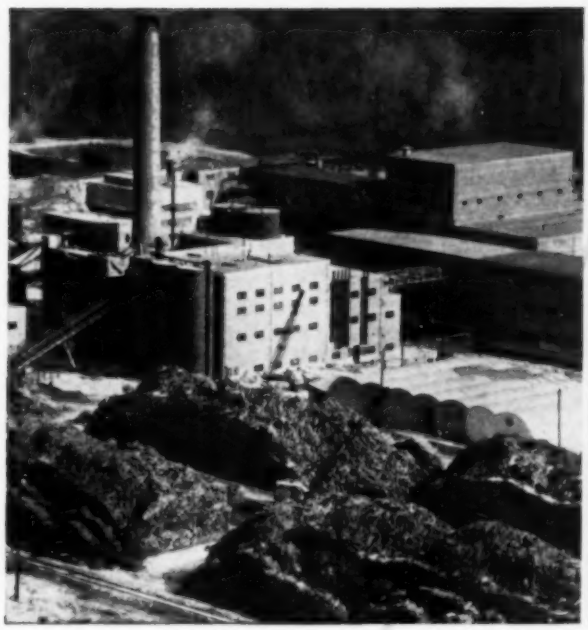
Since the alternating current series motor has the same general characteristics as its direct current prototype, it is possible by a careful compromise of design features to build series motors that can operate on either direct current or alternating current circuits of substantially the same voltage. Such interchangeable motors are called "universal" motors. They are used to a small extent for household appliances, such as desk fans, portable vacuum cleaners and hair driers. As a rule, the universal motor has a lower efficiency and is more troublesome in operation than either the direct current series motor or the alternating current series motor. Universal motors are built almost invariably in small sizes only.

Q—What is the repulsion motor?

A—The repulsion motor has a stator like that of most single phase motors and a rotor like the armature of a direct current motor, but the opposite brushes on its commutators are "short circuited"; that is, connected by a conductor of negligible resistance. The brushes are placed so that a line connecting them makes a small angle with the neutral axis of the magnetic field of the stator. The stator induces a current in the armature which produces an armature field with poles in the neighborhood of the brushes. These have the same polarity as the adjacent field poles and are repelled by them so that this repulsion causes the armature to revolve. From this action the motor derives its name.

A repulsion motor of this original simple type has characteristics similar to the series motor. It has a high starting torque and moderate starting current. It has low power factor except at high speeds. For this reason it is often modified into the "compensated repulsion motor," which has another set of brushes placed midway between the short circuited set, and this added set is connected in series with the stator

Oh, I see



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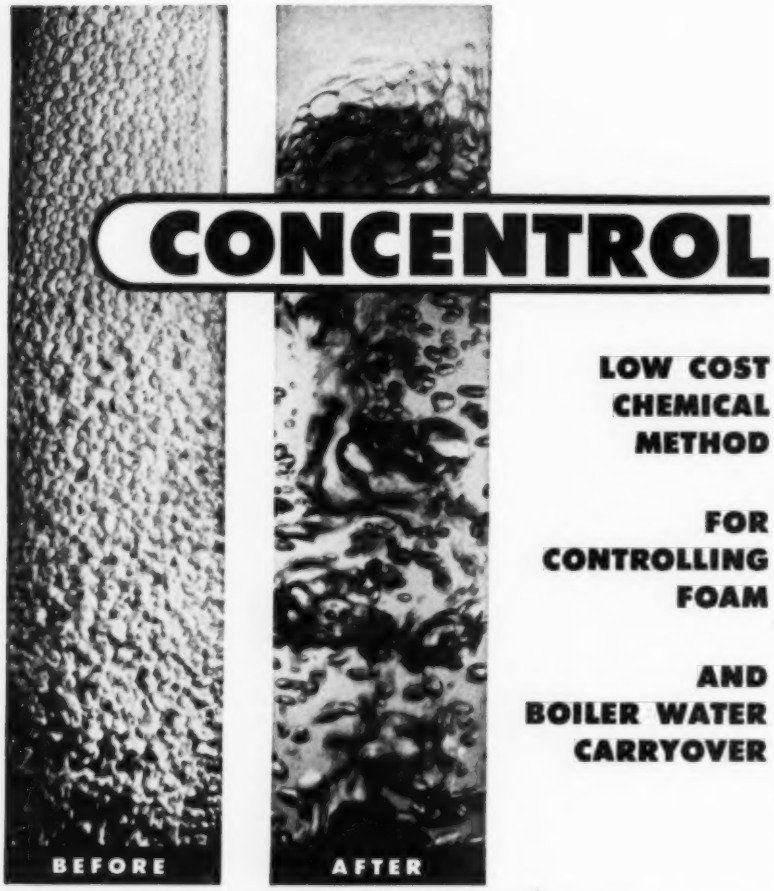

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winding. Another modification is known as the "repulsion induction motor" and in either of two constructions serves as a combination of the repulsion and single phase induction motors. Still another modification, known as the "series repulsion motor," combines the characteristics of the series motor and a simple repulsion type.

Q—What is a repulsion-start induction motor?

A—This motor has the same stator and rotor construction as the repulsion motor, and in starting the machine operates as a repulsion motor, thus availing itself of the excellent starting characteristics of this type which rapidly accelerates the rotor without requiring an external starter of any kind. On the end of the commutator there is provided a disk of high conductivity arranged so that it may be firmly pressed against the commutator by means of an automatic device. When the motor attains nearly full speed this governing device acts suddenly, thus effectively short circuiting the armature coils and converting the motor into an induction motor, running as such while continuing in operation.

Q—What is a repulsion induction motor?

A—A repulsion induction motor is a form of the repulsion motor which has a squirrel cage winding in the rotor in addition to the repulsion motor winding.

Plastic Pipe

(*Starts on page* 54)

of high impact styrene pipe will increase considerably during the coming years.

Polyvinyl Chloride

Plasticized polyvinyl chloride tubing has been available commercially in this country for almost twenty years but unplasticized polyvinyl chloride (P.V.C.) pipe was essentially unknown in this country five years ago. In spite of its apparent newness, there is more industrial experience with P.V.C. pipe than

any other plastic pipe. This type of pipe was introduced over fifteen years ago in Germany under the trade name Mipolam, Igelit P.C.U. and Vinidur. The various U. S. teams that visited Germany at the close of World War II were highly impressed with the successful use of P.V.C. pipe in the German chemical industry. As early as 1946, one plant alone in Germany was extruding over 1,000 tons of rigid P.V.C. pipe a month. It might be added that the Russians were sufficiently impressed with the successful use of P.V.C. pipe, that they dismantled one of the largest facilities and transported it and its technicians beyond the Iron Curtain.

Some P.V.C. acid pipe lines are still in use in Germany after over ten years of service. Most of these are 2 to 3 in. in diameters supported at 3 to 4 ft intervals with expansion loops every 300 to 400 ft. Most of the German T's, elbows, flanges and connectors were of heat-welded construction but some pipe was threaded with round profile threads and joined with suitable threaded fittings.

The first P.V.C. pipe used in this country was imported but extruded American pipe is now available in sizes up to 6 in. outside diameter. Larger pipe and duct work is now manufactured in this country by the welding of hot rolled sheet and is available in standard sizes up to 30 in. in diameter (15). Molded threaded fittings are available in sizes up to 2 in. outside diameter.

P.V.C. is the most chemical resistant plastic pipe available at nominal prices (16, 17, 18). The potential uses for unplasticized P.V.C. structures and the need for reliable information has been considered sufficient to justify the formation of a committee of the Society of Plastics Industry for investigation of this type material.

It is resistant to all acids including nitric and chromic acids, all alkalies and all corrosive salts at ordinary temperatures. It may be used to transport many corrosive solutions at temperatures up to 150 F. A recently developed plastic armoring technique permits its use at temperatures up to 190 F. P.V.C. is about as hard as aluminum and has a coefficient of expansion ap-

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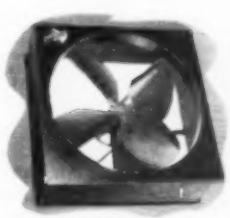

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Okadee valves are available in single-disc (one direction) and double-disc (two directions) types; screwed or flanged; ½" to 6" in standard A.S.A. dimensions; steel or semi-steel bodies (other materials to order); stainless steel or stellite seat facings; levers, rack-and-lever, worm-gear, hydraulic, pneumatic, automatic on-off control.

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proximately three times that of this metal.

Its cost compares favorably with some of the common alloys but, of course, it is much lighter in weight. Unlike many alloys, it is equally resistant to corrosives in the presence of oxygen. Based on over fifteen years' experience in Germany and less than five years in this country, it can be concluded that PV.C. will be one of the most widely used materials for pipe in American chemical industry.

Since piping costs may often comprise 25 per cent of the cost of the entire plant, economic consideration of various types of material is important. While valves and fittings constitute a large portion of piping costs, the comparative data given below are based primarily on the cost per foot of the pipe itself. More complete information on cost estimates may be obtained from other sources (19).

It must be recognized that the relative cost of pipe in various sizes may differ with each material and that many assumptions must be made in tabulating comparative cost data as given in Table I. Nevertheless, it is hoped that considerable general information may be obtained from these estimates which are based on relative differences in cost of 3 in. pipe.

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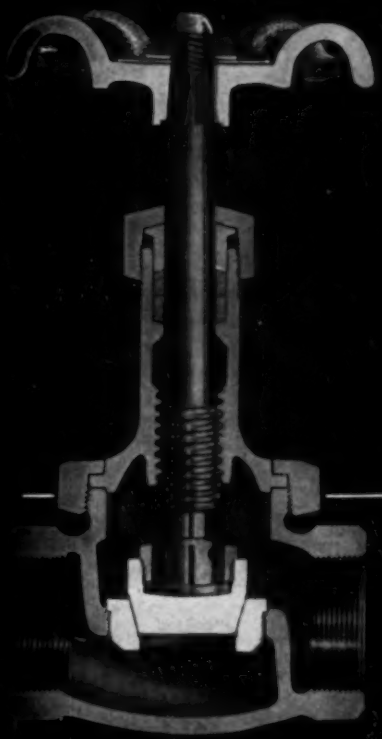

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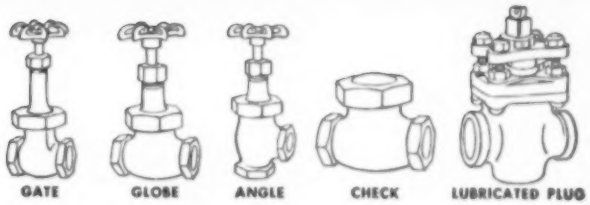

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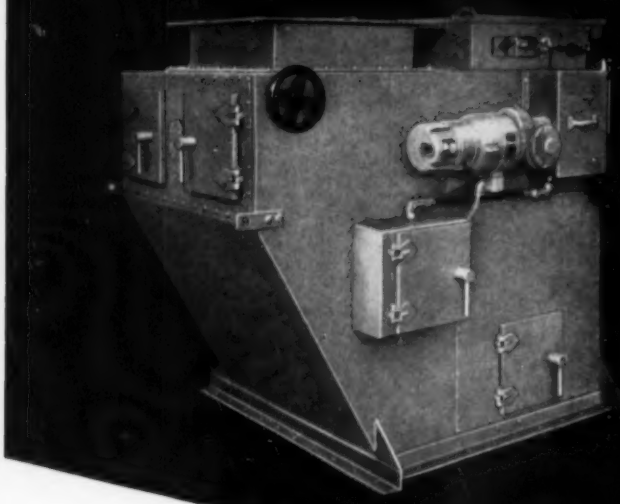

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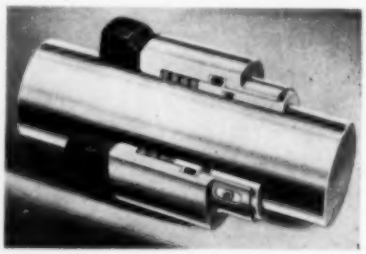
Equipment and Supplies

(*Starts on page* 8)

sample to be tested is reduced in temperature and pressure to measuring range so that standard type conductivity cells can be used.

Mechanical Seal for Rotating Pump Shaft

F-6 GARLOCK PACKING COMPANY, Palmyra, N. Y., has developed a new line of Ring Mechanical Seals for rotating pump shafts.



Garlock's "O"Ring Seals designed to provide leakless operation of rotary shafts on centrifugal pumps handling chemicals, petroleum products, edible liquids, pulp liquors, etc.

The small number of parts affords easy manufacturing adaptability of this improved seal to withstand any liquid, whether mild, harmfully corrosive or extremely hazardous, on rotating pump shafts. The seals are furnished in Type O, an unbalanced seal for pressures up to 200 psi, and in Type OB, a balanced seal for pressures up to and over 1,000 psi. Both types can be supplied with single spring or multiple spring, and in either pin-drive or sleeve-drive construction.

Type O seals are furnished for packing spaces 5/16 in. and larger. In some cases, Type O seals can be made for ¼ in. packing space. Type OB seals are furnished for packing spaces ⅜ in. and larger.

The "O" rings are available in "Teflon," Buna-N, Neoprene, or Silicone. The metal parts contacting the liquid can be furnished in any suitable metal.

Adapter Ties-In Remote Signal Units with System

F-7 PANALARM PRODUCTS, INC., 6312 North Broadway, Chicago 40, Ill., has introduced a new adapter unit which permits remotely located visual trouble signals

to operate as part of a common, plant-wide audio-visual annunciator system.

For the remote visual signals, either individual backlighted, illuminated nameplate units or bullseye lamps are furnished. They may be used for scattered locations on panelboards or operating locations in the plant. Bullseye lamps may also be used with separate On-Off lights to form a three-light control station. All signals connect to a common horn or bell which must be acknowledged by the operator when an "off-normal" condition develops. All moving parts and contacts are enclosed in hermetically sealed plug-in units which are corrosion-proof and suitable for Class I, Division 2 locations. Additional signals may be added to the system simply by inserting plug-in units into chassis receptacles.

The adapter cabinet is pre-wired for all standard audio-visual sequences. They may be interchanged in the field by simple terminal connections. Adapter cabinets are furnished for any desired number of signals, and operate from any type of remote contact device.

Heavy Duty Swivel Casters

F-8 THE FAIRBANKS COMPANY, 393 Lafayette Street, New York 3, N. Y., have announced Series "27" Casters, available in sizes 6 in., 8 in., and 10 in., double race swivel of heavy steel plate welded construction.

The large diameter outer ball race, precision machined with provision for pressure lubrication, combined with a Timken thrust bearing, to relieve the load on the countersunk kingbolt, insure easy swiveling under the heaviest loads. The caster is standard with a replaceable bolt axle. It is available with semi-steel roller bearing wheels and molded plastic wheels in the 6 in. size and with semi-steel roller bearing wheels, vulcanized rubber-tired roller bearing wheels and molded plastic wheels in the 8 and 10 in. sizes.

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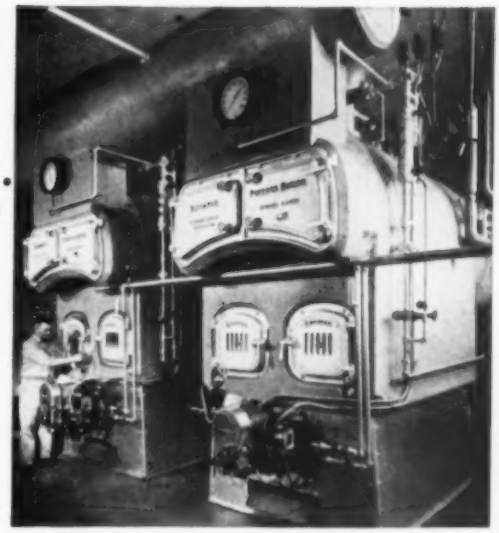

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The choice of Kewanee for the Stevens Memorial Hospital . . . selected as the "Hospital of the Month" by Modern Hospital Magazine . . . is in keeping with the trend of specifying Kewanee when dependable, economical heat or power is essential. And, it is significant that this building, erected with the finest materials and equipment throughout, was found in a U. S. Public Health Service study to have the *lowest construction cost per bed* of the 45 hospitals receiving federal aid during the period.

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DIAMOND **ROLLER CHAINS**

Pressure-Sensitive Tape

F-9 TOPFLIGHT TAPE COMPANY, York, Pa., has added several new types of tape material to its line of pressure-sensitive tape for write-in numbers and codes in inventory control work.

A paper, self-adhesive tape is used to place information on parts and bins in stock rooms. The tape can easily be removed when articles move or inventory figures change.

On large units and material stored outside factory buildings, waterproof cloth adhesive tape is used for the same purpose. This tape has a white waterproof cloth surface which can be written on with pencil, ink or crayon. The pressure-sensitive adhesive is also waterproof.

Improved Carbon Dioxide Portable Extinguishers

F-10 AMERICAN - LAFRANCE-FOAMITE CORPORATION, Elmira, N. Y., has announced a new complete line of portable carbon dioxide fire extinguishers with a simplified, faster acting valve.

Features of the improved valve are faster operation, easier leverage, removable siphon tube, side mounted safety disc. Double prong locking pin with one prong slightly sprung prevents pin from falling out while extinguisher is being moved, thereby insuring against accidental discharge. The carbon dioxide is an inert gas—noncorrosive, nonpoisonous, and odorless. It will not freeze and does not deteriorate with age.

Alfco's No. 15 portable unit

ELECTRO *xtra* DYNAMIC
dependable industrial motors
1 TO 250 HORSEPOWER (N.E.M.A. STANDARDS)
One-piece cast iron frames.
Extra large "free-flo" air channels.
Permanently aligned cast iron brackets.
Liberal size grease lubricated bearings.
Also a complete line of Direct Current motors and generators
ELECTRO DYNAMIC
DIVISION OF GENERAL DYNAMICS CORPORATION
BAYONNE, NEW JERSEY
The WINDING is the HEART of the motor
1. *Extra insulation* in stator slots and between phases.
2. *Extra impregnations* and bakings of the wound stator.
3. *Extra high-frequency testing* of insulation between turns.
4. *Extra care* in fitting coils into stator.
QUALITY SINCE 1880
WRITE TODAY FOR NEW ILLUSTRATED CATALOGUE NO. 572

Sound Design
Quality Materials
Precision Workmanship
the superiority of
JERGUSON VALVES
speaks for itself

OS&Y Valves for severe conditions

Rugged Jerguson OS&Y Valves are the ideal answer to meet high temperature or corrosive conditions where inside threads can't be tolerated. Efficient outside thread design eliminates possible freezing and allows the valve stem to work freely at all times.

GA Valves for instrument piping and general use

Tremendous time and cost savings are possible with Jerguson GA Valves. Threaded connections can be reduced from 10 to 3 . . . unions, nipples, reducers, elbows, tees, valve, and bleed valve are combined in one space saving unit.

Jacketed Heated-Cooled Valves

Designed especially for use with heated or cooled gages, Jerguson No. 93 Valves have a surrounding jacket for circulating the heating or cooling medium. They give safe, dependable, leak-tight service.

Globe Valves

Jerguson Globe Valves, furnished in ¼, ½, and ¾ inch sizes with renewable, regrindable seats. Can be furnished with Stellited stem and/or OS&Y.

All valves shown rated at 3000 lbs. @ 500°F. Send for detailed Data Units . . . or outline your requirements and let Jerguson engineers go to work for you.

JERGUSON
Gages and Valves for the Observation of Liquids and Levels
JERGUSON GAGE & VALVE COMPANY
100 Fellsway, Somerville 45, Mass.
Offices in Major Cities
Jerguson Tress Gage & Valve Co., Ltd., London, Eng.
Pétrole Service, Paris, France

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

Improved Insulation Material

F-11 THE PHILIP CAREY MFG. COMPANY, Cincinnati 15, Ohio, recently announced the improvement of Firefoil, a unique insulation material suitable for temperatures up to 900 F.

Firefoil now possesses greater water resistance, although it is not suitable for outdoor exposure. The material is composed of fine corrugated asbestos felts, firmly bonded and treated to render it light weight, strong and rigid.

A principal use of the product is in air conditioning plenum chambers. Other uses include machinery housings, partitions, bulkheads in ships, coil housings, ovens and fireproof linings for elevator shafts. This product can be nailed, screwed or bolted in place and is cut with ordinary carpenter's tools.

Mercury Lamp Gage Illuminator

F-12 RELIANCE GAUGE COLUMN COMPANY, 5902 Carnegie Ave., Cleveland, Ohio, announces a new boiler water gage illuminator using an efficient spot beam mercury lamp.

Enclosed in a housing which attaches readily to the water gage insert, the lamp provides a brilliant illumination of the water level meniscus. It is especially recommended for conditions where gages are 40 ft or more from the operating level as it greatly assists in transferring the meniscus image to the floor stand mirror (if periscope hood is used) or to the eye of the operator. It can, of course, be used at lesser heights if a particularly bright image is desired or where murky atmosphere or light from other sources impairs visibility.

NOW!
Direct Factory Service
BY AIR!

. . . on these famous CAMBRIDGE products for manufacturers in the INDUSTRIAL SOUTHEAST

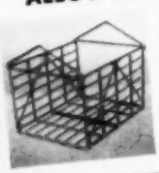
WIRE MESH CONVEYOR BELTS

for combining movement with processing in food, metalworking, chemical and ceramic plants. Any mesh or weave, metal or alloy.

INDUSTRIAL WIRE CLOTH

in bulk or fabricated form. From 20 x 250 mesh up to 4" openings. Any metal or alloy that can be drawn into wire.

ALLOY FABRICATIONS



crates, trays, racks or baskets for dipping, heat treating or handling in bulk. Produced to your specifications or from designs developed by our engineers.

FREE CATALOGS
illustrate and describe all Cambridge products. Write for your copies today. In Atlanta, call Alpine 8932.

The Cambridge Wire Cloth Co.
Dept. Y6 • Cambridge 6, Md.
WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS
OFFICES IN PRINCIPAL INDUSTRIAL CITIES

Waterproof Coating

F-13 THE DASCO CHEMICAL COMPANY, 1602 Thames St., Baltimore 31, Md., has developed a new clear, transparent silicone-base waterproofing material.

The new product, Dascone, contains no solvents, chlorinated rubber phosphates nor butyl menthacralate. Since it is solvent-free, it eliminates the high flash point which has, in the past, created a fire hazard.

Welding Torch Mixer

F-14 NATIONAL CYLINDER GAS COMPANY, 840 N. Michigan Ave., Chicago 11, Ill., has developed a new welding torch mixer using "Gas-tite" servene seating rings.

The gasket type seating, as contrasted with conventional metal-to-metal seating, permits the mixer to be attached to the torch handle without using a wrench. The mixer fits the company's standard welding torch handle.

Plastic Coating

F-15 ARMSTRONG CORK COMPANY, Lancaster, Pa., has developed a new plastic coating for use as both protection and color identification on insulated refrigerant, cold water, steam and other lines and insulated equipment.

Insulcolor will withstand temperatures to 160 F without cracking, shrinking, or crazing. It may be used over heat insulation, cork pipe covering and lagging, and also as a finish over cork-insulated air conditioning ducts. The tough finish furnishes high resistance to pumping and abrasion. It has high water resisting properties which make it suitable for either inside or outside applications.

How Tight? Drop Tight!

This True Ball Joint Makes the Difference

Spherically ground Dart seats say "no" to leaks as long as in service — and as often as piping is changed. Darts can be taken off the line and used elsewhere time and time again. That's economy! What's more, the tight seal comes easily without heavy wrenching or strain.

QUICK FACTS

- Two bronze seats provide top resistance to pitting and corrosion
- Heavy shoulders can withstand the strongest yanks of the wrench
- Nut and body of air-refined, high test malleable iron are practically indestructible
- Threads are full and clean-cut of hard metal to prevent stripping

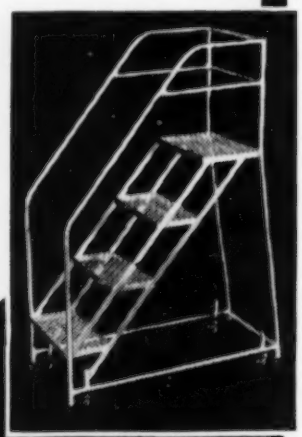
Experience proves that the men who *buy* Darts, the men who *use* Darts and the men who *sell* Darts have "something special"!

DART UNION COMPANY
Providence 5, Rhode Island
The Fairbanks Co. — Distributors
Boston•New York•Pittsburgh•Rome, Ga.

DART UNIONS

Call Us

For Ladders



Any Type Industrial Ladder For Mills

- Power Houses
- Storerooms
- or Special Applications

Cocker Machine & Foundry Co.
Gastonia, N. C.

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

Spray Attachment

F-16 THE PRIME-MOVER CO., Muscatine, Iowa, has added a sprayer attachment to its line of accessories for use with the 1500 lb capacity bulk handling unit.

Like all Prime-Mover accessories, the sprayer latches to the chassis for quick interchanging with the 10 cu ft dump bucket, flat bed, or snow blade, and is powered from the take-off shaft of the Prime-Mover. The sprayer is 55 gal capacity and comes equipped with an 18' boom spray for groundskeeping or decontamination in large areas, and a hand hose for other common spray applications.

Hydraulically Operated Loading Ramp Design

F-17 ROTARY LIFT COMPANY, Box 2177, Memphis 2, Tenn., has introduced a completely new, hydraulically operated loading ramp for transfer of materials from loading docks to trucks and trailers.

A built-in safety device locks the new Leva-Dock automatically in position in case of sudden movement of the vehicle. Sturdy torque-frame construction carries the motor and equipment on the torque-bar for easy access for maintenance purposes.

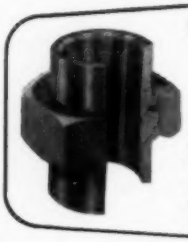
Rotary Lift Company's Leva-Dock supplies automatic adjustment to truck and trailer beds of varying heights. It compensates 4-ways for out-of-level variances and spring deflections during loading or unloading

Four steel sections comprise the new platform. The unit is locked into position when not in use to become an integral part of the whole loading platform and takes a load up to 20,000 lb rolled in any direction.

Catawissa PERFECT SEAL Unions

HOT FORGED from solid, rectangular steel bars, designed and produced for dependable, long-life service under the severest piping conditions!

A TYPE FOR EVERY USE!
FOR ALL PRESSURES!
FOR ALL TEMPERATURES!

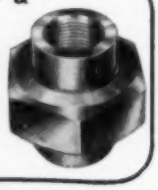


Standard & Double Extra Heavy UNIONS
Available with screwed or socket weld ends. 3000-lb. sizes ⅛" to 3"; 6000-lb. sizes ⅛" to 2".

ORIFICE UNIONS
With screwed or socket weld ends. 3000-lb. and 6000-lb. service.

MALE & FEMALE UNIONS
With steel-to-steel, bronze-to-steel, stainless steel-to-steel or orifice seats. 3000-lb. service only.

FULL STAINLESS & FULL ALLOY STEEL UNIONS
With screwed or socket weld ends. 3000-lb. and 8000-lb. service.

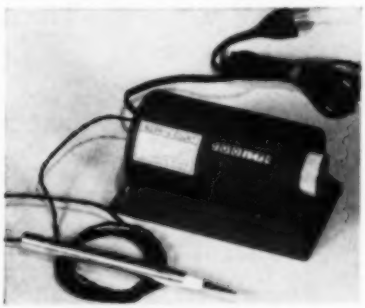


WRITE FOR CATALOG 11
showing the complete Catawissa line of Perfect Seal products

CATAWISSA VALVE & FITTINGS COMPANY
950 MILL ST. • CATAWISSA, PA.

Marking-Counting Machine

F-18 MAY ENGINEERING CO., 6055 Landershim Blvd., North Hollywood, Calif., has introduced the "Mark-N-Count," a machine for marking and counting simultaneously.



Mark-N-Count machine designed to eliminate errors in checking, counting, estimating and inventory.

A pencil device is used to check items or blueprints for estimating purposes. An audible click registers each count in marking and counting items in production, inventory, etc. A knob is turned for quickly resetting to zero.

Shop Assembled Water-Tube Boiler

F-19 COMBUSTION ENGINEERING, INC., 210 Madison Ave., New York 16, N. Y., has developed a new line of standardized, shop-assembled water-tube boilers known as the C-E Package Boiler, Type VP.

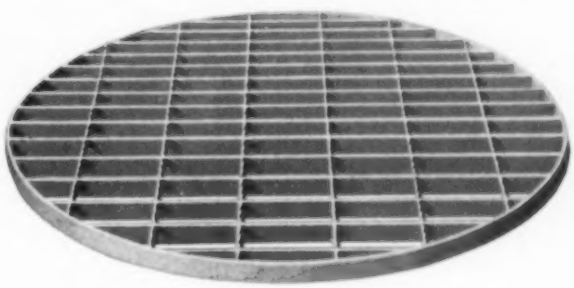
The design is based on the two-drum, vertical-bent-tube arrangement with a water-cooled furnace in front of the convection surface. In this new unit there is a higher ratio of furnace-wall cooling to furnace volume than in any other boiler of its size and type. This feature assures rapid and efficient heat absorption and lower gas temperatures entering the convection bank. It also results in less slag formation and aids in minimizing furnace maintenance.

Combustion Engineering's new unit designed to meet demand for standardized boilers operating in medium pressure range (up to 250 psig) and for steam capacities ranging from 4000 to 30,000 lb/hr.

This boiler is designed for pressure firing of oil or gas either alone or in combination. It is completely shop-assembled, ready for shipment as a unit with firing equipment, setting, forced-draft fan and automatic control.

Through the use of a centrifugal-type forced-draft fan, the boiler operates more quietly than those units employing typical high-speed blowers. Since this fan supplies air to the furnace at a pressure high enough to overcome the draft loss through the unit, neither a high stack nor an induced-draft fan is required. The omission of the induced-draft fan results in a reduction of noise and eliminates maintenance required by such a fan.

REMOVE THE DANGER OF OPEN AREAS



Here's the solution!

Blaw-Knox Electroforged Steel Grating is the ideal "coverage" for unprotected pits, light wells, basement stairways and other hazardous open areas. It is a one-piece steel "material" that provides safe footing under any conditions, and admits the maximum of light and air. *Strong . . . Silent . . . Secure.* Thousands of installations are still on the job after 20 years of traffic!

Send us dimensional sketch

We will then forward you price on grating cut to exact size. No nuts, no bolts, no special tools required. Don't delay . . . write today and make those danger spots both safe and usable!

BLAW-KNOX COMPANY
Grating Department
BLAW-KNOX EQUIPMENT DIVISION
2034 Farmers Bank Building, Pittsburgh 22, Pa.

ELECTROFORGED® STEEL

BLAW-KNOX GRATING

LUBRIPLATE No 630-AA IS PRACTICALLY A UNIVERSAL LUBRICANT

—says

THE SPOKANE PORTLAND CEMENT, CO.

"With the introduction of LUBRIPLATE No. 630-AA, we were able to satisfy all our needs for solid type lubricants with only two LUBRIPLATE Products. LUBRIPLATE No. 630-AA might almost be considered a universal lubricant. Furthermore, it has effected marked savings in both lubricants and labor!"

For nearest LUBRIPLATE distributor, see Classified Telephone Directory. Send for free 56-page "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

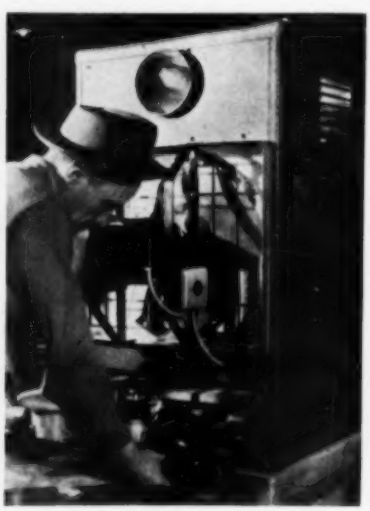
Bronze Needle Valve

F-20 THE LUNKENHEIMER CO., Box 360, Annex Station, Cincinnati 14, Ohio, has announced a new Gland-Type Bronze Needle Valve.

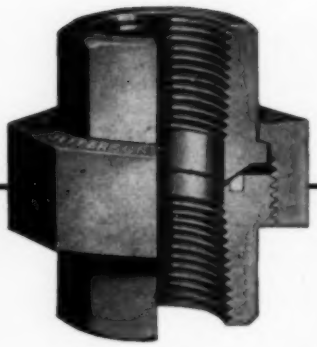
The new valve is small and compact, which makes it ideal for use in pin-point control on small lines where fine regulation of flow is essential. It is manufactured in a full range of sizes from ⅛ in. to 1 in. and in both globe and angle patterns.

Suspended Gas Fired Units

F-21 DRAVO CORPORATION, Heating Department, Machinery Division, 1203 Dravo Bldg., Pittsburgh 22, Pa., announces the extension of its line of space heaters with the addition of suspended gas fired units.



Suitable for natural, manufactured, mixed, liquid petroleum, sewage or coke-oven gas, and available with input capacities ranging from 85,000 to 215,000 Btu per hour, the Model D unit heater comes with a standard fan, and Model DB with squirrel-cage blower for short duct runs. Model DD (without blower) is designed as a heating unit to be built directly into air-conditioning duct systems. The cast-iron bunsen type burner assembly can be removed quickly for easy servicing and cleaning. The drawer frame slides out with the mounted burners and all controls, making them easily accessible.



Ask Yourself these questions

before you buy

pipe unions again

1. Are the unions you're using designed having a truly spherical ball joint with brass seats recessed for protection and free-flow?
2. Do they have octagonal ends for easy tightening by any type wrench?
3. Are they *plainly marked* for 300# pressure?
4. Are they made of Air Furnace Malleable Iron with a tensile strength of 55,000 p.s.i. and air tested before shipment?

If you can't answer "Yes" to *all* these questions, you're not using

Jefferson **UNIONS**

. . . and you're not taking advantage of all these features which are back of Jefferson's reputation for high quality, maximum service and economy at a slightly higher cost.

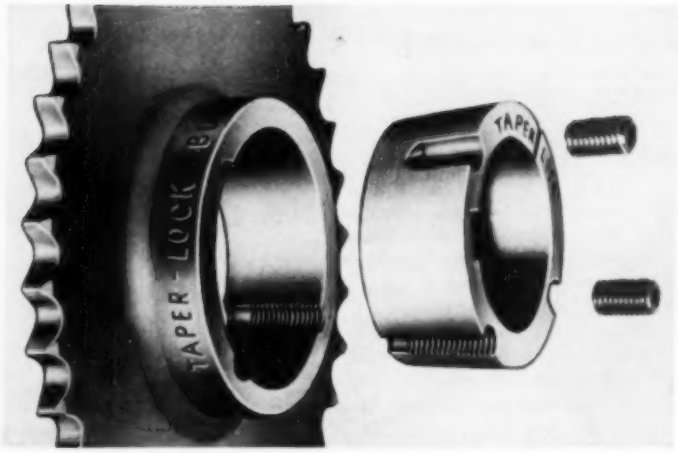
Jefferson offers OWG 2000# to 2" and 1000# up to 4". The line includes AAR male and female unions, Enduro 300#, Excel 250# and Master 150# unions. All iron seats are also available in all types.

Contact your nearest distributor or us direct for your requirements.

•

JEFFERSON UNION CO.,

650 W. 26th St., New York 1, N. Y.
79 Gooding St., Lockport, N. Y.
45 Fletcher Ave., Lexington 73, Mass.



Type B Taper-Lock Sprocket (exploded view) of the Dodge Manufacturing Corporation.

Taper-Lock Stock Roller Chain Sprockets

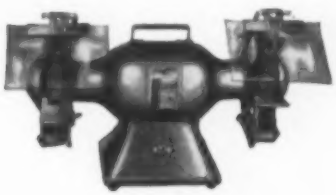
F-22 DODGE MANUFACTURING CORPORATION, Mishawaka, Ind., announces a line of Taper-Lock Sprockets and Dodge roller chain.

One of the chief advantages claimed for the new products is that they bring a new "off-the-shelf" availability to roller chain drives. The sprockets and bushings will be available in a range of sizes for the majority of industrial applications. Distributors will carry in stock for immediate delivery a complete range of B-type steel sprockets, 40 to 100 pitch. Indicating the extent of the line, the range in 50 pitch, for example, is 11 to 112 teeth. All bushings and the smaller size sprockets will be packaged individually. Chain will be packaged in 10 ft lengths and can be furnished in 50 and 100 ft reels.

The sprockets are compact, having no flange and no protruding parts. They occupy no more space on the shaft than standard sprockets. The flush design contributes to safety.

Small Utility Grinder

F-23 THE BALDOR ELECTRIC COMPANY, 4353 Duncan Ave., St. Louis 10, Missouri, announce development of their 600 series, de luxe grinder.



Features, according to the manufacturer, are wide clearance between wheels and motor frame, eyeshields supplied as standard equipment, and carrying handle. Grinders carry 6 in. diameter wheels and are offered in ¼ and ⅓ hp ratings.

UNIT AIR CONDITIONERS

Are now available in three sizes—3, 5 and 7½ horsepower. These superior Units have extra-large refrigerating surfaces: they deliver more cooling effect per dollar, and we can prove it! Built into them are 70 years' experience.

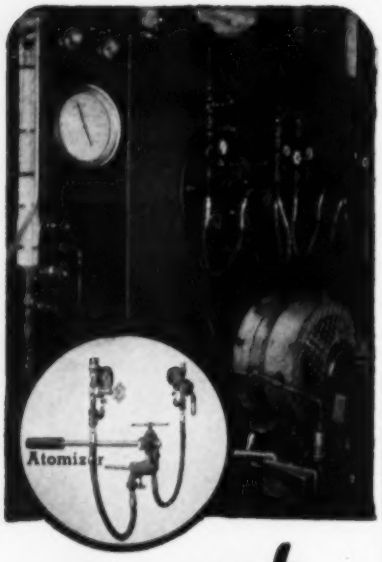
Get the full facts on Frick Units before you buy: write for Bulletin 522. If you need a still larger air conditioning system, ask for Bulletin 504. Branches and Distributors in principal cities, the world over.

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

WAYNESBORO, PENNA. U.S.A.

Also Builders of Power Farming and Sawmill Machinery



Efficient combustion with

Enco Burners

FOR ALL GRADES OF LIQUID FUEL

Enco Burner Units of Steam or Mechanical Atomizing Types are made in various sizes with capacities from 1 to 1000 gallons per hour.

Designed for operation either with or without air registers and for natural or forced draft.

The Enco Interchangeable Atomizer is made for instant change of guns for operation by either steam or mechanical system or to cover a wide range of capacity.

Enco Atomizers are used with various types and makes of pulverized-coal and gas-burner units to provide a dual fuel unit for cold starting, or for full-load operation when coal or gas is not available, or use when oil is the more economical fuel.

We have made many installations during the past 25 years and are ready to cooperate with those looking for better operation and assurance against loss of steam output.

THE ENGINEER CO.
Enco 75 West St. New York 6, N. Y.

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

Impact Wrench

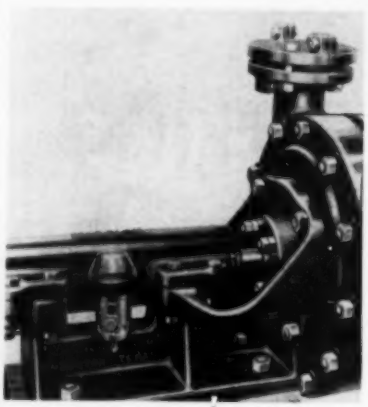
F-24 THOR POWER TOOL COMPANY (new corporate name of Independent Pneumatic Tool Company), Aurora, Ill., has announced a new ⅝ in. portable pneumatic reversible impact wrench.

The wrench is powered by an air motor which transmits power to the impact mechanism through a torque increasing planetary gear system. All heat treated, alloy steel gear elements, precision finished, are mounted in full anti-friction bearings, providing extra power for heavy service and long life. Drawing loads and quick run-down of the nut are easily accomplished for various screw fastenings.

Plastic Centrifugal Pump

F-25 MISSION MANUFACTURING COMPANY, Centrifugal Pump Division, Humbi Road, Houston, Texas, has introduced a new centrifugal pump made of a composition containing a phenol-formaldehyde resin or furfuryl alcohol resin and an inert filler of asbestos or graphite for handling acids, bases, salts, and many solvents and other chemicals.

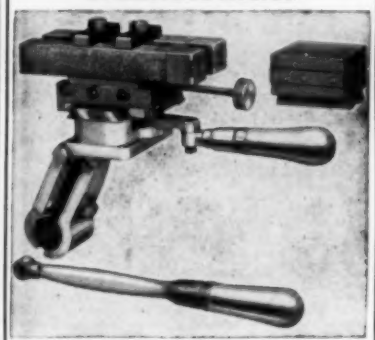
The pump features a solid plastic concentric casing with solid plastic semi-open impeller. A long heavy bearing housing insures perfect alignment. Specially designed slinger and housing cap with triple internal seals



Mission centrifugal solid plastic pump made in 3 in. suction 2 in. discharge sizes only. Operating at 1750 rpm, pump will handle capacities up to 300 gpm and heads up to 110 ft. Suitable for operating temperatures up to 265 F.

MARTINDALE

COMMSTONE HOLDER



Holds Commstones rigid and true for concentric resurfacing of commutators and slip rings while running at normal speeds in their own bearings. Grinds commutators 4½ to 4¾" wide. Used with two Commstones in stone holder or one Commstone in 2" box.

WIRE CREEPER

A new, speedy method of stringing additional overhead wires over houses, through trees, across congested areas, etc., by means of a remote controlled creeper that carries cord from one pole to next on available wire.

MICA-MILLER

A powerful, light-weight, low cost, easy to use Undercutter, operating from 1/5 h.p. Universal motor. Available with small, medium or heavy duty head (interchangeable). Also available with air motor, or flexible shaft drive.

Write for New 64-page Catalog No. 29 describing these and many other products for Industrial Maintenance, Safety and Production.

MARTINDALE ELECTRIC CO.
1334 Hird Ave. Cleveland 7, Ohio

Spherical Tanks on Tubular Towers

THE COLE Spherical Tank on Tubular Tower is unique in its field. We design and erect special tanks of this character. It provides an attractive and serviceable unit—economical to maintain, efficient in service and pleasing in appearance.

Write for special booklet on these modern, welded Spherical Tanks which provide gravity water pressure, and for copy of *latest Cole catalog, "Tank Talk."*

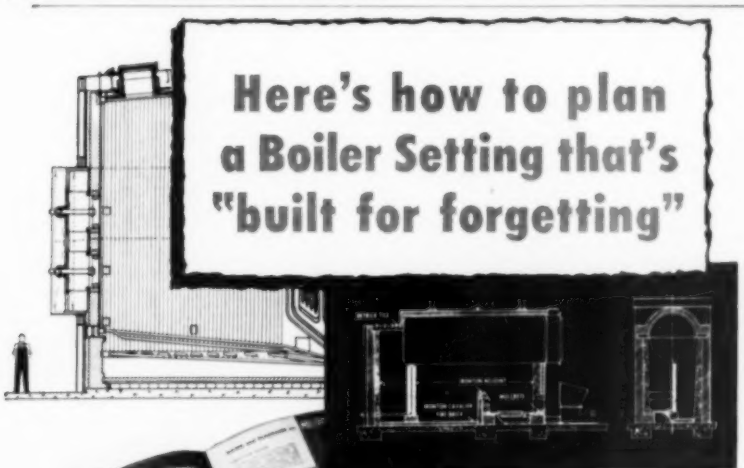
Established 1854

R. D. COLE MFG. CO.

NEWNAN, GEORGIA

ELEVATED TANKS • VESSELS • CYLINDERS
TOWERS • BINS • STANDPIPES

Here's how to plan a Boiler Setting that's "built for forgetting"



Concise Bulletins and Data Sheets on refractory applications should be in your files. Write now for your set.

Old boilers, new boilers, and any size they come...

When you line the fire box with an IRONTON refractory, it will be a long, long time before you give it another thought. Whether the job is done with fire clay brick, monolithic plastic refractory, or newly perfected castables . . . your best bet is an IRONTON product made from Kentucky flint and semi-flint clays. Get the facts today.

Make a "PATCH TEST"

Before you go into any boiler reconditioning job, tell IRONTON what you're up against. We'll send samples of materials for you to test under conditions in your own boiler setting.

RELIABLE REFRACTORIES

THE IRONTON FIRE BRICK COMPANY
IRONTON, OHIO

Representatives in the South:

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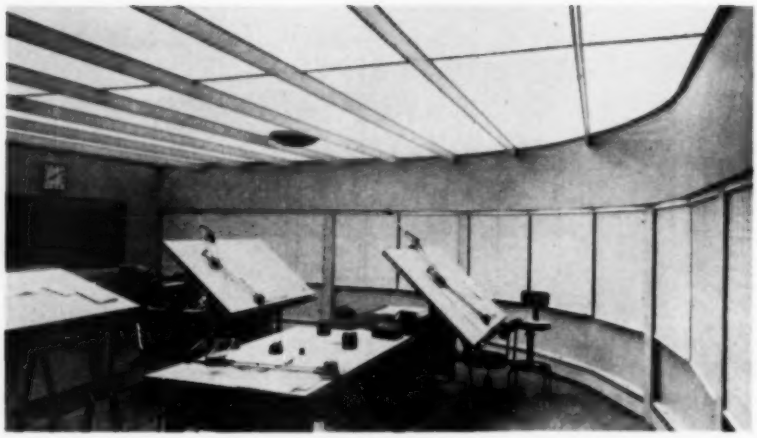
Kentwood, La. - - Phone 2191

protect the bearings from contamination. The pump is designed especially for mechanical seals, and the fluid end parts are of corrosion resistant solid plastic material.

For easy maintenance the bearing housing can be replaced completely without disturbing pedestal alignment or casing. Mechanical seals are easily installed and serviced because of the large drip pan on the pedestal which provides ample hand room for seal adjustment.



Note adaptability of the Acusti-Luminus ceilings to the curved walls of this drafting room. Design offers glareless, shadowless, even light, coupled with acoustical treatment. Ceiling of thin translucent corrugated plastic is hung below fluorescent tubes. Maintenance is very simple and low in cost.

Ceiling Design Illuminates Room and Deadens Noise

F-26 LUMINOUS CEILINGS, INC., 2500 West North Ave., Chicago, Ill., has announced an entirely new development in illumination and ceiling treatment as a solution to the problem of glare, noise and unsightly ceiling construction.

"Acusti-Luminus" Ceiling diffuses the room illumination over the entire ceiling area, giving it uniform distribution, eliminating shadows and reflected glare. At the same time, acoustical baffles, spaced at proper intervals, give the room a high degree of acoustical correction.

A translucent corrugated ceiling of thin vinyl plastic is suspended below continuous rows of fluorescent or slimline light sources, spaced for uniform diffusion. This plastic material comes in rolls three feet wide and is fastened to its supports at the ends, so it may be easily removed and rolled up in sections, to provide quick access to light fixtures, air conditioning ducts, or valves that may be above the ceiling.

The ceiling is often installed below sprinkler heads, as the characteristic of the plastic causes it to lose rigidity at 140° so that it drops from its supporting channels. This is an important feature as it makes possible attractive decorative effects in areas that would otherwise be marred by the exposed sprinkler heads and their additional cost.

The acoustical correction is provided by perforated steel baffles affixed to the channels holding the ceiling. These baffles contain fibre glass absorption pads. The ceiling may be installed either with or without these acoustical baffles. The plastic may be rolled up when removed for cleaning.

Anti-Fog Liquid for Use on Glass and Plastic Surfaces

F-27 INDUSTRIAL PRODUCTS COMPANY, 2892 N. Fourth St., Philadelphia 33, Pa., announces a new anti-fog liquid for use on glass and plastic surfaces where fogging and steaming present a problem.

The product, which is said to be practical for use on glasses, goggles, windows, windshields, etc., cleans and treats in one application. It contains silicones, but no alcohol or glycerine. It is packaged in 4 oz plastic bottles, and is also available in bulk units.

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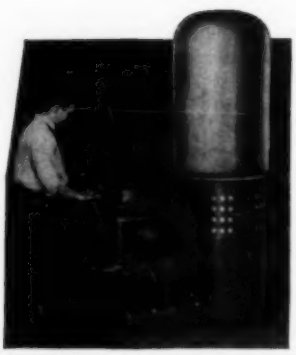

Where one or several dust-producing machines are operated without a dust collecting system or too remote from the existing collection system, here's the efficient, trouble-free and low-cost solution. KIRK & BLUM Unit Dust Collectors are compact, easy to install or move, offer exceptional efficiency and capacity.

For complete details, request literature on metal or woodworking types from The KIRK & BLUM MFG. CO., 3198 Forrer Street, Cincinnati 9, Ohio.

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R-2 **INSULATION-COLOR**—Bulletin, 4 pages—Illustrates and describes "Insulcolor", a tough plastic coating that comes in six colors and white, for applying color identification of brine, cold water, steam and other lines in combination with the insulation finish.—ARMSTRONG CORK COMPANY, Building Materials Division, Lancaster, Pa.

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R-4 **STEAM GENERATORS** — Dutton Boiler Division Catalog, 42 pages—Loose-leaf catalog contains separate bulletins describing EconoTherm compact, automatic packaged boiler; EconoMist self-contained portable horizontal return tubular type boiler; Boiler Compound Feeder; Five Way Convertible Firing; and related equipment.—HAPMAN-DUTTON COMPANY, Dutton Boiler Division, Kalamazoo 6, Mich.

R-5 **SHEAVE SPECIFICATIONS**—Guide No. 83, 94 pages—Gives dimensions and weights of QD V-Belt sheaves and hubs. Construction features are described by cut-away photographs; installation and removal instructions are illustrated by pictorial panels. Tables and line drawings give face width, hub position, hub length, minimum and maximum bore, etc. —FORT WORTH STEEL & MACHINERY CO., P.O. Box 1038, Fort Worth, Texas.

R-6 **MECHANICAL SEAL** — Form No. 455, 12 pages—Illustrates and describes general types and styles of Dura Seals designed to meet the sealing requirements of centrifugal and rotary pumps, autoclaves, agitators, blowers and similar rotating equipment. — DURAMETALLIC CORPORATION, Kalamazoo, Mich.

R-7 **MATERIALS HANDLING** — Brochure, 4 pages—Covers the Adjust-A-Dock and the Adjust-A-Truck, designed to increase handling efficiency on shipping and receiving docks. Contains application and equipment photographs, engineering drawings, specifications, operating and construction features. — ROWE METHODS, INC., 2534 Detroit Ave., Cleveland 13, Ohio.

R-8 **ELECTRONIC CRANE SCALE**—Bulletin, 4 pages—Illustrates industrial applications of electronic crane scale, with remote recording of weight printed on tape, ticket or cards. Discusses installation, operation, safety protection, and other features. — STREETER-AMET COMPANY, 4101 Ravenswood Ave., Chicago 13, Ill.

R-9 **HYDRAULIC UNITS**—Catalog No. 5209, 8 pages—Presents information on hydraulic pumps, motors and transmissions. Includes specifications, line drawings, and applicational photographs.—BERRY DIVISION, Oliver Iron and Steel Corporation, South 10th and Muriel Sts., Pittsburgh 3, Pa.

R-10 **MEASURING FLATNESS** — Bulletin No. L-404, 6 pages—Illustrates and describes measuring of surface flatness through light band reading with interpretation of readings explained. Provides instructions on care and operation of monochromatic lights and optical flats. Includes information on line of precision measuring and lapping equipment.—CRANE PACKING COMPANY, 1800 Cuyler Ave., Chicago 13, Ill.

R-11 **SPACE FILTER**—Bulletin 1505-1, 4 pages—Explains construction and function of the "Ultra-Aire Space Filter" for product and process control, and health protection. Illustrated with diagrams and photographs. Lists applications in various industries, and includes ordering informa-

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R-14 **LUMINOUS CEILINGS**—Bulletin, 8 pages—"Acusti-Luminus Ceilings" for no noise, no glare, and even light distribution are described, with construction and installational drawings, and specific plant application photographs.—LUMINOUS CEILINGS, INC., 2500 W. North Ave., Chicago 47, Ill.

R-15 **CHAINS AND SPROCKETS**—Bulletin No. 52-1, 54 pages—Gives information on selection of roller chain drives, with formulas, tables and examples. Chain dimension, strengths, weights, and prices are included. Section deals with stock sprockets, their characteristics and prices. —BALDWIN-DUCKWORTH, Division of Chain Belt Company, Dept. P. R., Springfield 2, Mass.

R-16 **CONDENSER TUBE INSERTS**—Bulletin 500, 4 pages—Describes condenser tube inserts designed to help put tubes of boiler heat exchanger equipment back in operation without delay. Discusses operation and application. Illustrated with equipment photographs.—THOMAS C. WILSON, INC., 21-11 44th Ave., Long Island City 1, N. Y.

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R-18 **VALVES**—Valve Catalog No. 352A, 44 pages—Lists needle, globe, plug, check, relief, and special valves. Includes gage protectors and snubbers, bleeders and vacuum control valves. Details of construction are shown, and complete specifications and dimensions are given.—REPUBLIC MANUFACTURING COMPANY, 1930 West 77th St., Cleveland 2, Ohio.

R-19 **PLASTIC SEALING COMPOUND** —Bulletin No. B7A, 4 pages—Describes plastic sealing compound to stop spiral leakage in threaded joints. Discusses causes for threaded pipe joint failure and tells how the compound is actually a metallic gasket in liquid form. Illustrated. —CHICAGO GASKET COMPANY, 1275 W. North Ave., Chicago 22, Ill.

R-20 **LATHES**—Cir. 51-8, 4 pages—Describes 25"/40" D series lathes; discusses advantages, components, removable block gap specifications, standard equipment, and extra equipment. Illustrated with photographs.—THE NEBEL MACHINE TOOL CO., Central Parkway and Primrose St., Cincinnati 25, Ohio.

R-21 **GEAR COUPLINGS** — Catalog C4, 16 pages—Covers new line of flexible gear couplings; discusses advantages, typical applications, standard types, special types, and includes engineering data. Illustrated with line drawings and

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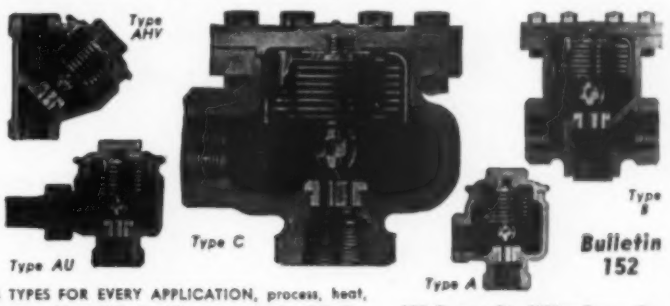

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R-23 **PIPE LINE FILTER**—Bulletin No. 210, 4 pages—Describes four new low pressure pipe line filter models. Contains specifications, engineering and performance data covering new type filter for removal of dust, dirt, pipe scale, condensed oil and water vapor from compressed air lines.—DOLLINGER CORPORATION, 11 Centre Park, Rochester 3, N. Y.

R-24 **INDUSTRIAL STRAINERS**—Booklet, 12 pages—Covers applications for steel mill and industrial use of self-cleaning strainers. Discusses operation; stainless steel mesh cone screens; bronze slotted cones; porcelain discs; pipe sizes; strainers for river, lake, canal and well water; sea water strainers; ammoniacal liquor strainers; and strainers for gasoline, oil, and chemicals.—S. P. KINNEY ENGINEERS, INC., 201 Second Ave., Carnegie, Pa.

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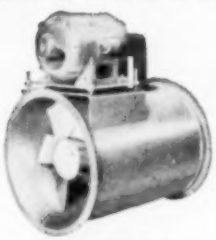

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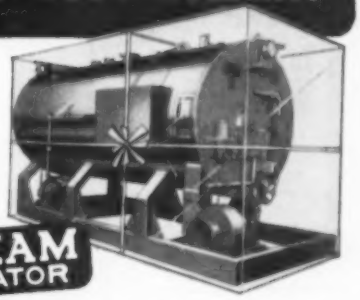

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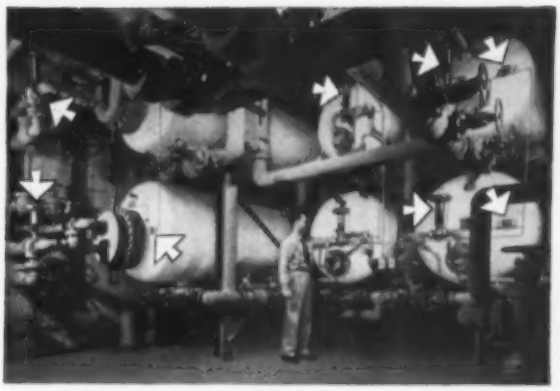

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What's Your Water Temperature Control Problem?

POWERS ...with their many types of thermostatic regulators and 60 years experience is well qualified to help you find the right type of control for these applications:

Forced Hot Water Heating Systems; various types of Water Heaters and Heat Exchangers; Jacket Water Cooling for Air Compressors, Diesel and Gas Engines also Cyclotrons, Chocolate Enrobers and Plastic forming Presses; all types of Shower Baths and Hospital Hydrotherapy; processing X-Ray, Regular and Colored Film — and hundreds of other uses.

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Compressed Air Operated

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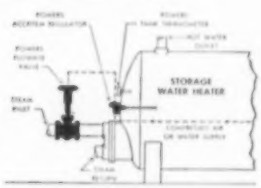
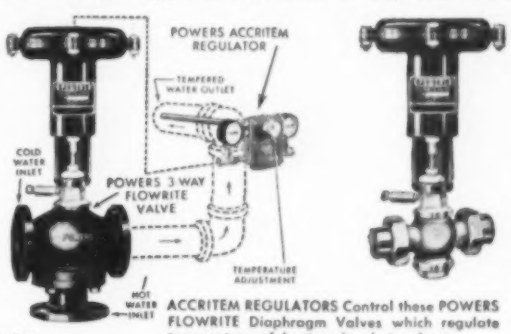


Powers Accritem Regulators Give Years Of Dependable Service



ACCRITEM REGULATORS Control these POWERS FLOWRITE Diaphragm Valves which regulate temperature of heaters in photo above.

(a92)

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ADVERTISER'S INDEX

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A

Ace Pipe Cleaning Contractors, Inc... 120
Advertising Council, Inc. ..... •
Air Preheater Corp. ..... •
Allen-Bradley Co. 5
Allen-Sherman Hoff Co. ..... •
Allis-Chalmers Mfg. Co.....Second Cover
American Blower Corp. .....79 and 80
American Engineering Co. 98
American Monorail Co. 53
Ames Iron Works 125
Anaconda Wire Cable Co..35, 36, 37 and 38
Armstrong Machine Works 39
Atlantic Steel Company 100
Atlas Valve Co. 96

B

Babbitt Steam Specialty Co. 127
Babcock & Wilcox (Boilers)..... •
Babcock & Wilcox Refractory Div... •
Bailey Meter Co. ..... •
Bertram Co., Harvey P. 125
Bell & Zoller Coal Co. ..... •
Bellows Co. ..... •
Belmont Packing & Rubber Co. 102
Bird-Archer Co. 104
Bituminous Coal Institute 23
Blackburn-Smith Mfg. Co., Inc. ..... •
Blaw-Knox Co. (Grating) 115
Blaw-Knox Co., Power Piping Division •
Boiler Tube Co. of America 123
Buffalo Forge Co. ..... •
Bunting Brass & Bronze Co. ..... •
Bussmann Mfg. Co. .....14 and 15
Byers Co., A. M. ..... •

C

Cambridge Wire Cloth Co. 112
Carolina Refractories Co. 129
Catawissa Valve & Fitting Co. 114
Chapman Valve Mfg. Co. 50
Chicago Bridge & Iron Co. 9
Chicago Electric Co. 126
Clarage Fan Co. 1
Classified Ads 126
Cleaver Brooks Co. 7
Cochrane Corporation 29
Coker Machine & Foundry Co. 114
Cole Mfg. Co., R. D. 119
Combustion Engrg. Inc. ..... •
Combustion Equipment Division Todd Shipyards Corp. ..... •
Condenser Service & Engineering Co., Inc. 34
Continental Gin Co. .....Third Cover
Cook's Sons, Inc., Adam ..... •
Cooper-Bessemer Corp. ..... •
Copes-Vulcan Division — Continental Foundry & Machine Co. 48
Coppus Engineering Corp. ..... •
Crane Company ..... •
Crane Packing Co. ..... •
Cyclotherm Corp. 96

D

Dart Union Co. 113
DeLaval Steam Turbine Co. ..... •
Deming Company 101
Detroit Stoker Co. .....46 and 47
Diamond Chain Co., Inc. 110
Dowell, Inc. ..... •
Drew & Co., Inc., E. F. ..... •
Duo-Safety Ladder Corporation 130

E

Edward Valves, Inc. 24
Electric Service Co. 126
Elgin Softener Corp. ..... •
Elliott Co. 91
Emerson Elec. Mfg. Co. 105
Engineer Co. 118
Erie City Iron Works ..... •
Ernst Water Column & Gage Co. ... 126
Everlasting Valve Co. ..... •

F

Fairbanks Co. ..... •
Farrar & Trefts, Inc. ..... •
Finnigan, J. J., Co., Inc. 130
Fisher Governor Co. ..... •
Fiske Bros. Refining Co., Lubriplate Div. 116
Flexible Steel Lacing Co. ..... •
Flexible Tubing Corp. 95
Fluor Corporation, Ltd. 49
Foster Wheeler Corp. ..... •
Frick Company 117

G

Gai-Tronics Corp. ..... •
Garlock Packing Co. ..... •
General Coal Co. 125
General Dynamics Corp., Electro Dynamics Division 111
General Electric Co. ..... 42 and 43
Gilbert Associates, Inc. ..... •
Graver Water Conditioning Co..... •
Grinnell Co., Inc. 45
Gulf Oil Corp. 41

H

Hagan Corp. (Boiler Water Conditioning) 25
Hagan Corp. (Combustion Control).. •
Hall Laboratories, Inc. 25
Homestead Valve Mfg. Co. ..... •

I

Industrial Crane & Hoist Corp. .... •
Industrial Equipment Co. 122
Industrial Products Co. 127
Industrial Furnace Construction Co., Inc. 121
Infilco Incorporated ..... •
Ingersoll-Rand Co. ..... •
Iron Fireman Mfg. Co. ..... •
Ironton Fire Brick Co. 119
I-T-E Circuit Breaker Co. ..... •

J

Jefferson Union Co. 116
Jenkins Bros. .....Third Cover
Jerguson Gage & Valve Co. 112
Johns-Manville, Inc. 20

K

Kellogg Company, M. W. ..... •
Kennedy Valve Mfg. Co. ..... •
Kewanee-Ross Corp. 109
Kirk & Blum Mfg. Co. 121

L

Ladish Co. 97
Leffel & Co., The James ..... •
Leibfried Mfg. Corp., C. H. ..... •
Leslie Co. ..... •
Liberty Engineering & Mfg. Co..... 121
Lindberg Engineering Co. 129
Link-Belt Co. 44
Lubriplate Division, Fiske Bros. Refining Co. 116

M

Manning, Maxwell & Moore, Inc..... 28
Manzel, Inc. 92
Marley Co., Inc. 26
Martindale Electric Co. 118
Mason-Neilan Regulator Co. ..... •

N

National Airoil Burner Co. ..... •
National Aluminate Corp. ..... •
National Tube Co. 27
National Valve & Mfg. Co. 22
Nebel Machine Tool Co. ..... •
Nicholson & Co., W. H. 123

O

Oakite Products, Inc. ..... •
Ohio Injector Co. 103
Okadee Mfg. Co. 106
Okonite Co. ..... •
Orr & Sembower, Inc. ..... •

P

Pacific Pumps, Inc. 11
Panellit, Inc. ..... •
Peerless Boiler & Engineering Co.... 129
Peerless Pump Division Food Machinery & Chemical Corp. ..... •
Permutit Co. .....Back Cover
Petro 31
Philadelphia Gear Works ..... •
Pipe & Tubular Products, Inc. ..... •
Plibrico Company 94
Porter, Inc., H. K. ..... •
Powell Co., Wm. 52
Powers Regulator Co. 127
Prat-Daniel Corp. ..... •

R

Raybestos-Manhattan, Inc., Packing Division ..... •
Rectorseal Division Rector Well Equipment Co., Inc. 124
Reliance Gauge Column Co. 99
Republic Flow Meters Co. ..... •
Richardson Scale Co. 108
Riley Stoker Corp. ..... •
Rust-Oleum Corporation ..... •

S

Sarco Co., Inc. 130
Sier-Bath Gear & Pump Co. ..... •
Sinclair Refining Co. 81
Southern Natural Gas Co. ..... •
Southern Railway System 19
Sprague Electric Co. 130
Springfield Boiler Co. ..... •
Squires Co., C. E. ..... •
Standard Industrial Products, Inc... •
Standard Oil Co. of Ky. 30
Sterling Electric Motors, Inc. 93
Subox, Inc. ..... •
Superior Combustion Industries, Inc.. •

T

Taylor Forge & Pipe Works ..... •
Terry Steam Turbine Co., The ..... •
Texas Co. 2
Thermix Corp. ..... •
Todd Shipyards Corp. Combustion Equipment Division ..... •

U

Union Asbestos & Rubber Co. 32
U. S. Hoffman Mchy. Corp. 124
U. S. Treasury ..... •
United States Steel Co. 27

W

Wagner Electric Co. 40
Walworth Co. 107
Want Ads 126
Warren Steam Pump Co., Inc. ..... •
Water Cooling Corp. ..... •
Webster Engineering Co. ..... •
Western Precipitation Corp. ..... •
Westinghouse Electric Corp. (Apparatus Div.) .....12 and 13
Whiting Products 126
Wickes Boiler Co. 89
Wiegand Co., Edwin L. ..... •
Wiggins Co., John B. 122
Wilson, Inc., Thomas C. ..... •
Wing Mfg. Co., L. J. ..... •
Worthington Corporation ..... •

Y

Yarnall-Waring Co. .....21 and 85

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Assoc. Prof. of Mech. Engr., Georgia School of Technology

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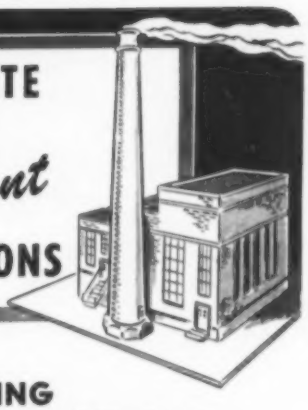

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A wire or letter will bring a qualified representative to discuss your problems with you.

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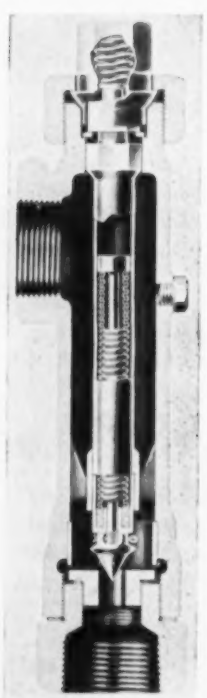
VERTICAL BOILERS
ALUMINUM • COPPER • STAINLESS STEEL • STAINLESS CLAD TANKS
STEEL SMOKESTACKS • SMOKE BREECHINGS • AIR COMPRESSOR TANKS
• *Making Shapes from Boiler Plate Since Eighteen Hundred and Eighty-Eight* •

Special Steam Trap for Outdoors



This liquid expansion type of thermostatic steam trap discharges condensate continuously at adjustable temperatures below 212°F., whereas most traps discharge condensate at near to steam temperature.

You can save steam by installing this trap where hot condensate now discharges to waste, cools by returning in outdoor, or long indoor piping systems, or flashes to steam in open returns systems.

Withstands water-hammer, vibration, pressure pulsations, superheat or rolling and pitching on ships. Can't freeze or air-bind.

Especially recommended for tracer lines for piping carrying viscous fluids; track and switch heaters; outdoor storage tanks. Also Marine service such as tanker heating coils, fuel oil storage; whistles, winches and other steam operated deck machinery. Write *Sarco Company, Inc., Empire State Bldg., New York 1, N. Y. for Bulletin No. 260-3.*

Advt. 601

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LIGHT WEIGHT FOR EASE OF HANDLING— BUILT TO LAST A LIFETIME!

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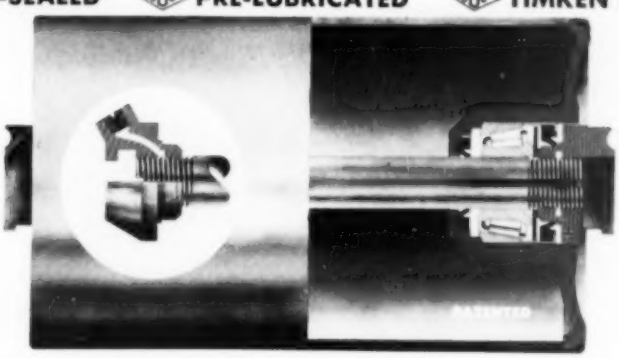
CGC UNIT-SEALED CGC PRE-LUBRICATED CGC TIMKEN BEARINGS



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Saves Labor!
Saves Belts!
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Continental's Unit-Sealed "UST" Conveyor Idlers, incorporating Timken Bearings, Garlock Klozures, are the answer to the operator's prayer.

The Unit Bearing Assemblies—"sealed unto themselves" provide an ample but not excessive grease reservoir. This represents a saving of grease and further eliminates any possible migration of the grease from upper to lower bearings on inclined rolls. The lubricant is a top quality water repellant grease of a stable consistency with a wide temperature range for long life.

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For detailed information on these idlers write for Bulletin S.I.-116

CG-5210

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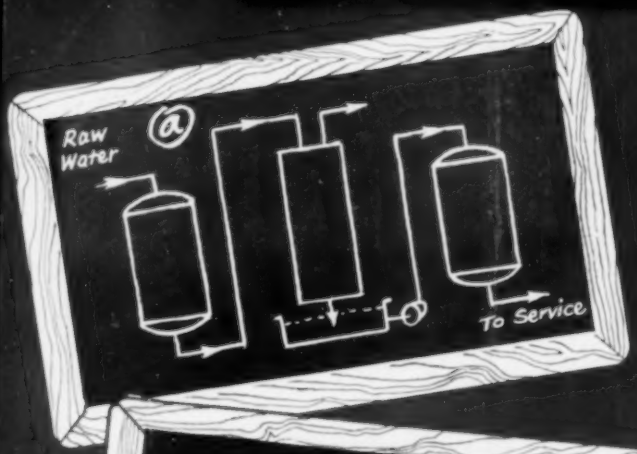
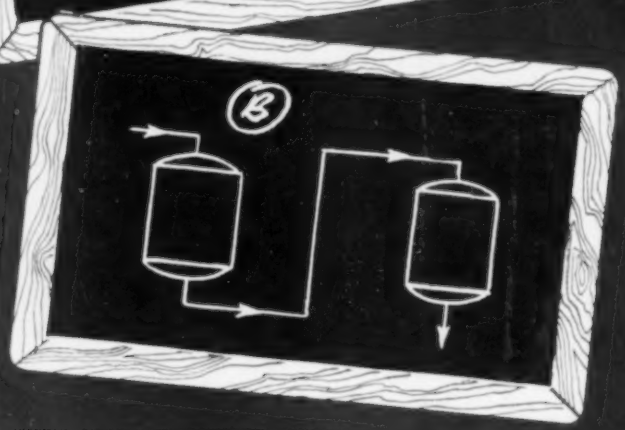
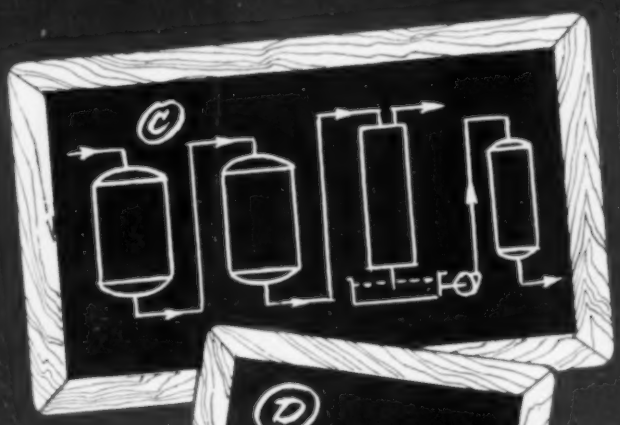
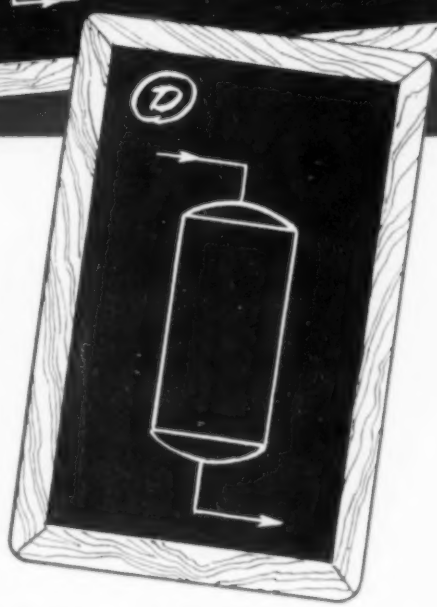
The ABC's of Better Boiler Feedwater









● Permutit ion exchange processes remove dissolved mineral matter including silica. And produce feedwater equivalent to distilled water at only a small fraction of the cost of distillation.

For high pressure power plants that means it is now possible to avoid boiler scale and hard-to-remove silica deposits on turbine blades.

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Several arrangements of equipment are used depending on the individual requirements—composition of the raw water, volumes to be treated, boiler pressures and operating conditions. Permutit will cooperate with you in selecting the hookup best suited for your boiler plant. Write today for full information.

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B **TWO STEP WITHOUT DEGASIFIER:** No repumping required. Used where total quantities are not very great or with waters of low bicarbonate content.

C **THREE STEP WITH DEGASIFIER:** Extremely economical and effective arrangement for waters containing relatively high amounts of sulfates and chlorides.

D **MIXED BED:** An extremely compact arrangement. Both cation and anion exchangers are in the same unit. Used alone or as a final step.

The equipment described is also furnished in multiunit arrangements to treat whatever quantities of water are required and to meet all operating conditions.

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